C. E. EGNÉR & J. G. HOLMSTRÖM.

COOLING DEVICE FOR TELEPHONE TRANSMITTERS.

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999,019.

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Fig. 1.

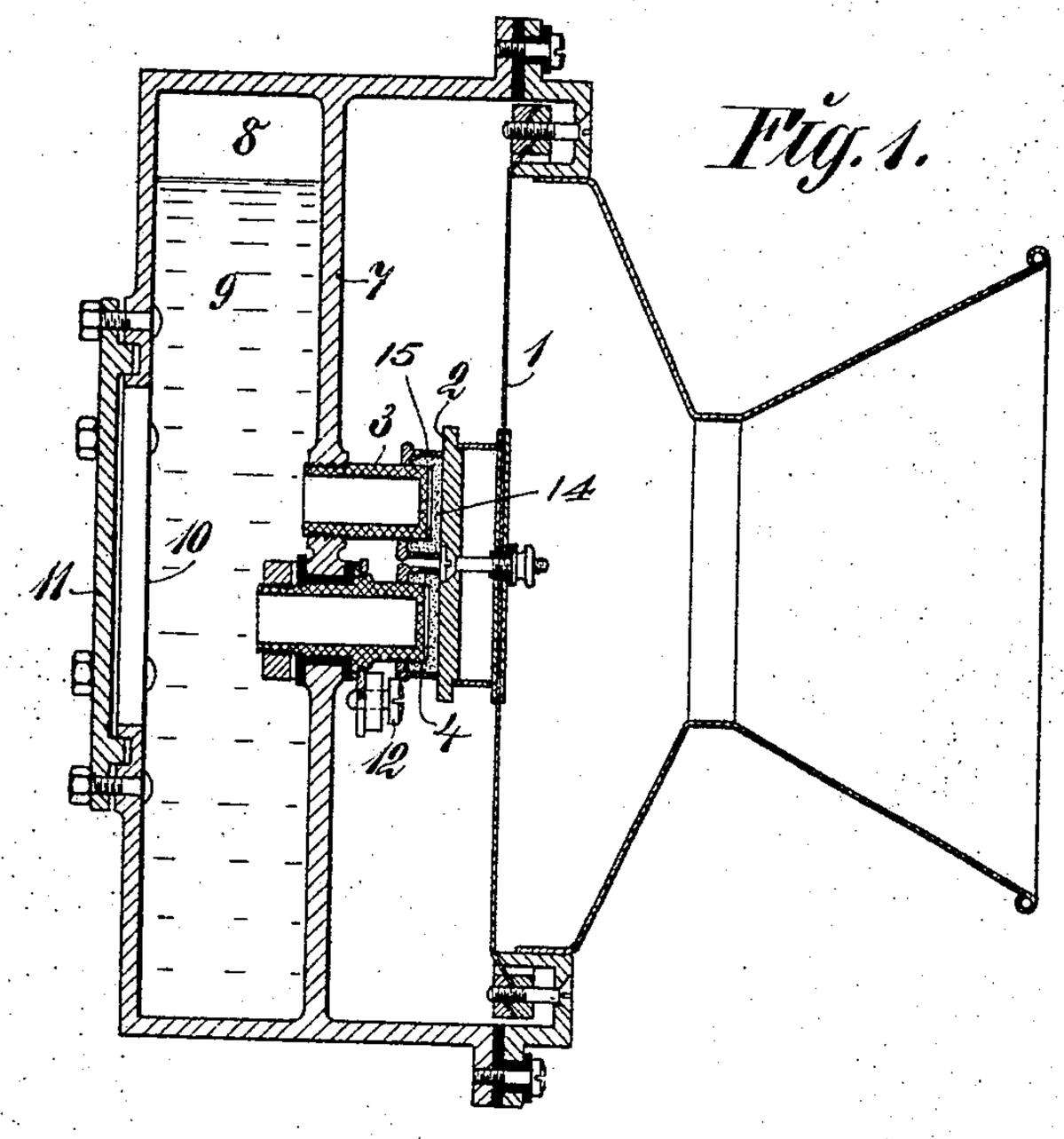
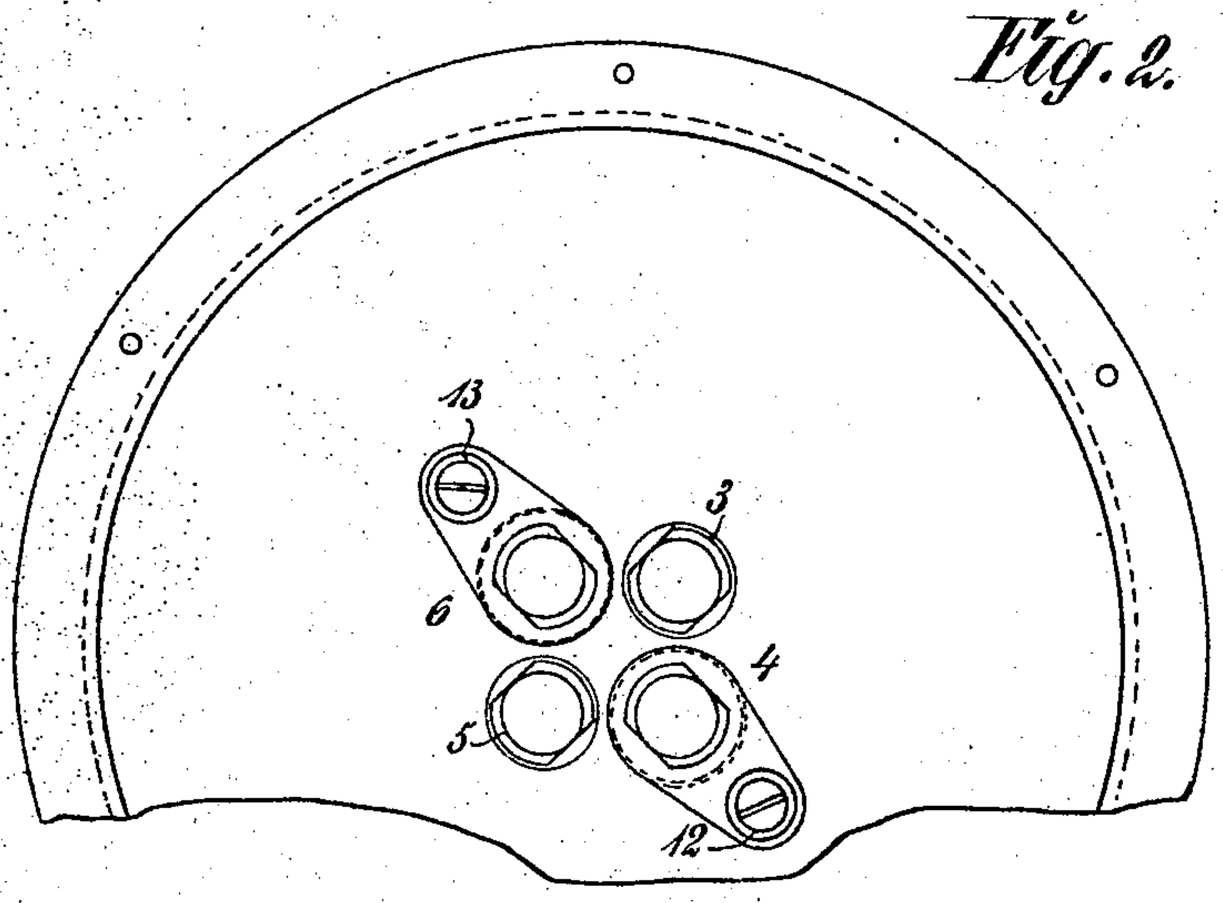


Fig. 2.



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UNITED STATES PATENT OFFICE.

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COOLING DEVICE FOR TELEPHONE-TRANSMITTERS.

999,019. Specification of Letters Patent. Patented July 25, 1911.

Application filed November 2, 1910. Serial No. 590,334.

To all whom it may concern:

Be it known that we, CARL EMIL EGNÉR, a subject of the King of Sweden, and resident of Blekingegatan 63, Stockholm, in the Kingdom of Sweden, and JOHAN GUNNAR HOLMSTRÖM, a subject of the King of Sweden, and resident of Saltsjö-Storängen, in the Kingdom of Sweden, have invented certain new and useful Improvements in Cooling Devices for Telephone-Transmitters, of which the following is a specification, reference being had therein to the accompanying drawing.

In our pending application for U. S. Letters Patent Ser. No. 551688 a cooling device for telephone transmitters is described, in which the electrodes are cooled by a certain quantity of liquid or a solid body of a low melting point inclosed in a receptacle in the transmitter.

This invention relates to an improvement of the said cooling device.

Figure 1 in the accompanying drawing is a cross section of a transmitter provided with the improved cooling device. Fig. 2 is a front view of the transmitter; the diaphragm and mouthpiece being omitted.

1 is the diaphragm and 2 the electrode oscillating within the same. The stationary electrodes 3, 4, 5 and 6, four in number, are fixed to the inner wall 7 of the transmitter casing. The electrodes 3 and 5 are in metallic contact with the wall 7, while the electrodes 4 and 6 are insulated from the said wall by means of an intermediate layer of ebonite or the like. The wall 7 forms the side wall of a receptacle 8, which is provided in the transmitter casing and is filled or partially filled with a cooling liquid 9. In the rear wall of the transmitter casing an opening 10 is provided, through which the said liquid is poured into the box, the said opening being then hermetically sealed by a cover 11. The carbon-grains are denoted by 14 and the means for inclosing the grains, felt or the like, by 15.

The electrodes 3, 4, 5 and 6 ought to be made of a metal of a great heat conductivity, for instance silver, copper, and are preferably cored out from their inner ends, so that cooling liquid is located as near as possible to the surfaces of the electrodes.

As stated above, two of the stationary electrodes viz. 2 and 5 are in metallic contact with the cooling box *i. e.* with the transmitter casing, while the two other electrodes 4 and 6 are insulated from the same. In order that the cooling liquid may not electrically connect the two pairs of electrodes, it must be insulating or, at least, exert a great resistance to the current. Pure alcohol, petroleum, oil and the like are suitable as cooling liquid, and also distilled water may be used in some cases. The insulated electrodes are each provided with a connecting screw 12 and 13 respectively for the conducting wires.

The transmitter may, as easily understood by those skilled in the art, be used either as a single acting or as a double acting transmitter. In the former case all the stationary electrodes 3, 4, 5 and 6 are connected by metallic conductors and the current passes through the carbon-grain cells to the oscillating electrode 2 and then to the diaphragm 1. Consequently, the four cells are connected in parallel. In the latter case the two insulated electrodes 4 and 6 are connected by a suitable wire. The current passes from the said electrodes 4 and 6 in parallel through their carbon cells to the electrode 2 and then back through the carbon cells of the two other electrodes 3 and 5 and from these electrodes 3 and 5 to the casing of the transmitter. Consequently, the carbon-grain cells are connected two in parallel and two in series. All the cells may, if wanted, be connected in series. For that purpose the oscillating electrode 2 is divided into two halves, one insulated from the other. In such case the current passes to the electrode 4, for instance, then through the first carbon-grain cell to the one part of the electrode 2, from the said part through the second cell to the electrode 3, through the casing of the transmitter to the electrode 5, the third cell, the other part of the electrode 2, the fourth cell and the electrode 6. Consequently by providing the transmitter with a number of suitable connecting screws the four cells of the transmitter can be connected by an easily effected shifting of the wires, either in series, two by two, or in parallel, according as a greater or less resistance in the transmitter is wanted. The cells must not necessarily be four in number, as described above and shown in the drawing, but the number is adapted to the purpose in each special case. The principal thing is that all the stationary electrodes, the insulated ones as well as the electrodes metal-

lically connected with the casing of the transmitter, are in direct contact with the cooling liquid, so that the cooling operation is as effective as possible. The heating of the said liquid, effected inside the electrodes, results in currents in the liquid, so that cold and warm parts of the same are mingled with each other and the whole bulk will have substantially the same temperature. Consequently, the heat generated in the electrodes is distributed in the whole cooling box, so that a too great increasing of the temperature in the carbon-grain cells is obviated.

The described cooling box is closed, so that absorbing of heat, effected by the evaporating of the liquid, is dispensed with. A small air chamber must evidently be provided in the box, in order that the liquid may not break the box, when expanded by the absorbed heat. A safety valve may be provided, if necessary, which will open, if the pressure increases to a too great extent. A safety valve is necessary, if such a cooling liquid is used, for instance distilled water, in which a generating of gas caused by electrolysis is to be feared. The box may, evidently, be open, so that evaporation can take place, and this arrangement is suitable, if specially strong currents are used in the transmitter.

Having now described our invention, what we claim as new and desire to secure by Letters Patent is:

1. In a telephone transmitter, the combination of a receptacle containing a cooling liquid exerting great resistance to the electric current and electrodes in direct contact with the said liquid, substantially as described and for the purpose set forth.

2. In a telephone transmitter, the combination of a receptacle containing a cooling liquid exerting great resistance to the electric current and electrodes cored out from their inner ends, the said electrodes communicating with the said receptacle and also containing a cooling liquid, substantially as described and for the purpose set forth.

3. In a telephone transmitter the combination of a chamber containing a cooling liquid, exerting great resistance to the electric current, and a number of electrodes insulated from the said chamber and in direct contact with the said liquid, substantially as described and for the purpose set forth.

4. In a telephone transmitter the combination of a chamber containing a cooling liquid, exerting great resistance to the electric current, and a number of electrodes, insulated from the said chamber and cored out from their inner ends, the said electrodes communicating with the said chamber and also containing cooling liquid, substantially as described and for the purpose set forth.

In witness whereof, we have hereunto signed our names in the presence of two subscribing witnesses.

CARL EMIL EGNÉR.
JOHAN GUNNAR HOLMSTRÖM.

Witnesses:
HEDING MELINDER,
ROBERT APELGREN.