No. 722,139. PATENTED MAR. 3, 1903.

A. POPOFF.

SELF DECOHERING COHERER SYSTEM.

APPLICATION FILED MAR. 8, 1900.

NO MODEL.

Fig. 1.

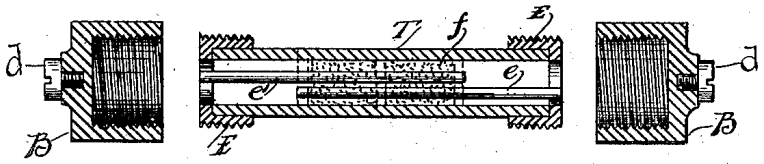


Fig. 2.

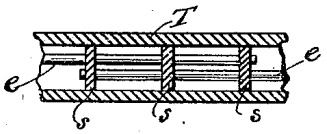


Fig. 3.

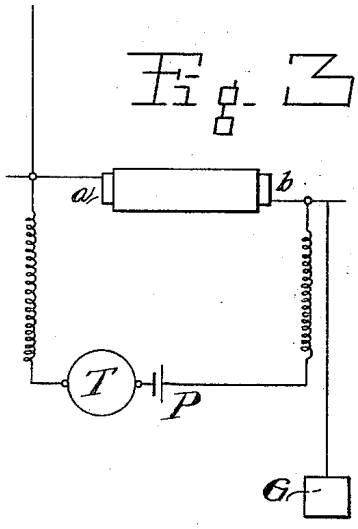


Fig. 4.

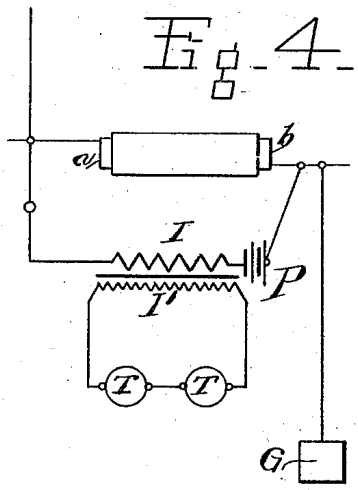
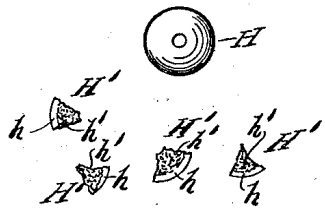


Fig. 5.



Witnesses:
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UNITED STATES PATENT OFFICE.

ALEXANDRE POPOFF, OF CRONSTADT, RUSSIA.

SELF-DECOHERING COHERER SYSTEM.

SPECIFICATION forming part of Letters Patent No. 722,139, dated March 3, 1903.

Application filed March 8, 1900. Serial No. 7,823. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDRE POPOFF, a subject of the Russian Emperor, and a resident of Cronstadt, Russia, have invented certain new and useful Improvements in Self-Decohering Coherer Systems, of which the following is a specification.

The improved receiver of messages sent into space by means of electromagnetic oscillations is based upon Branly's discovery of the tubes filled with filings known as "coherers" or "radioconductors" and presenting a great resistance to the passage of electric currents and adapted to become suddenly conductors when influenced by electric oscillations, even when these oscillations have but little strength, which reach said tubes either directly or through conductors secured to the tubes, said conductors serving to collect the electric waves. The change of resistance is ordinarily accomplished instantaneously and continued after the passage of the electric oscillation. In order to stop the conductibility of the metal filings as quickly as is possible, the tube is ordinarily shaken or jogged, and to this end automatic devices have been invented. In my invention such shaking or jogging becomes unnecessary, and the tube when once installed for its purpose may remain untouched. This result I obtain by filling the tube with a conducting-chain of metal grains having different degrees of oxidation on their surfaces, as hereinafter described. Thus the changes or variations of the resistance are not so great and are of shorter duration and constancy than in coherers heretofore employed. At the first influence of the electric oscillations, the resistance of such radioconductors decreasing, it maintains still a certain value, and during all the time of the influence of electric oscillations said resistance will be varying. These variations of the resistance are easily perceived in the telephone. Under these conditions the arrangement of the improved receiver embodies in its main portion a circuit comprising the tube filled with the granular material, one or more batteries, one or more telephonic apparatuses in which the operator hears special sounds which are sharp, short, or long and correspond to each discharge at the transmitting-station. Thus at the receiving-station I can obtain a good reception of the signs of the Morse code. The special periodicity possessed by each periodical interrupter actuating the transmitter and sending into space electrical waves to actuate the radioconductor at a distance can readily be recognized in the telephone or telephones, and it is thus possible to distinguish from each other aerograms transmitted by different stations and received at different moments.

In the drawings, Figure 1 is a longitudinal section through a radioconductor or coherer constructed according to my invention with the various members detached and separated. Fig. 2 is a detail of the tube with its non-conducting partitions. Fig. 3 represents the simplest form of connecting up with telephone instruments at the receiving-station. Fig. 4 is an alternate form of circuit arrangement in which an induction-coil or converter is employed. Fig. 5 represents, on an enlarged scale, grains of the improved granular medium I propose to employ.

Referring now to said drawings, T is a tube, made of glass or other insulating material, within which are the two electrodes *e e'*, preferably small blades of platina arranged in close proximity to and lapping past each other and secured to the metallic mountings E E' at each end of the tube, over which mountings the metallic caps B B' are screwed to serve as contact-pieces. The two exterior conductors *a b* terminate at binding-screws *d* on these caps and are therefore in electrical touch with the electrodes when the caps are in place. Within this tube is a filling *f*, of granular material, consisting of special metallic grains, below described, in contact with the electrodes. To insure that the grains shall be properly distributed along the length of the tube, small partitions *s*, made of insulating material, may be placed at intervals inside the tube. The filling which I employ consists of grains of hard steel with sharply-defined edges and a granular fracture, prepared in such manner as to permit of varying degrees of oxidation on their surfaces. These special grains are obtained in practice from the ordinary polished steel beads of commerce. By crushing these beads H into grains of the required dimensions steel splinters H' are obtained taking different degrees

of oxidation on their surfaces, the rounded and polished exteriors *h* taking but a very thin layer of oxid, the inner or orignally bored or perforated but unpolished parts taking a thicker layer and those surfaces *h'* corresponding to the fractures or lines of cleavage giving sharp prominent granular contact-points or projections almost entirely exempt from oxid. This variation of the state of oxidation on the surface of the metal grains, together with the similarity of their form, insures a perfect sensitiveness and steadiness.

In Fig. 3 I have illustrated diagrammatically the simplest form of apparatus and circuits at a receiving-station, the telephone T and battery P being placed in shunt around the coherer, which is grounded at G. In Fig. 4 the shunt-circuit includes the battery P and the primary I of an induction-coil or converter, and the telephone T is in the circuit of the secondary I' of said induction-coil.

In practice the coherer or radioconductor should be so supported as to be protected from jars incidental to traffic or other extraneous causes during the reception of a message, and, as already intimated; with said coherer constructed, arranged, and connected in the manner described the usual relay and tapper or automatic decoherer are omitted, the coherer or radioconductor regaining its sensitiveness itself without receiving any shock or being tapped.

I claim—

1. In combination with a self-decohering coherer or radioconductor comprising a tube filled with a granular metallic resistance-chain, as described, and with its circuit, connected up without relay or tapper, one or more telephones connected to said circuit in such manner as to be operated thereby.

2. The combination with a self-decohering coherer or radioconductor, comprising a tube filled with a granular metallic resistance-chain, as described, and with its circuit which includes the primary of an induction-coil, of the secondary circuit of said coil, and one or more telephones placed therein.

3. The radioconductor or coherer, comprising the non-conducting tube, the metallic mountings at each end thereof, the metallic electrodes extending into said tube and lapping past each other, the granular filling, and the non-conducting partitions extending transversely through said filling.

4. The granular filling for coherers, as herein described, consisting of grains of hard steel having their individual surfaces of various degrees of oxidation.

5. The granular filling for coherers, as herein described, consisting of steel grains having portions of their individual surfaces smooth and polished and portions angular and with fractured cleavage, as described.

6. The granular filling for coherers, as herein described, consisting of crushed steel beads the individual grains of which retain the rounded polished surface as well as the acquired angular fractured surfaces.

In testimony whereof I have hereunto set my hand in presence of two witnesses.

ALEXANDRE POPOFF.

Witnesses:

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