E. J. BURKE.

COHERER.

APPLICATION FILED OCT. 29, 1906.

993,024.

Patented May 23, 1911.

2 SHEETS—SHEET 1.

Fig. 1.

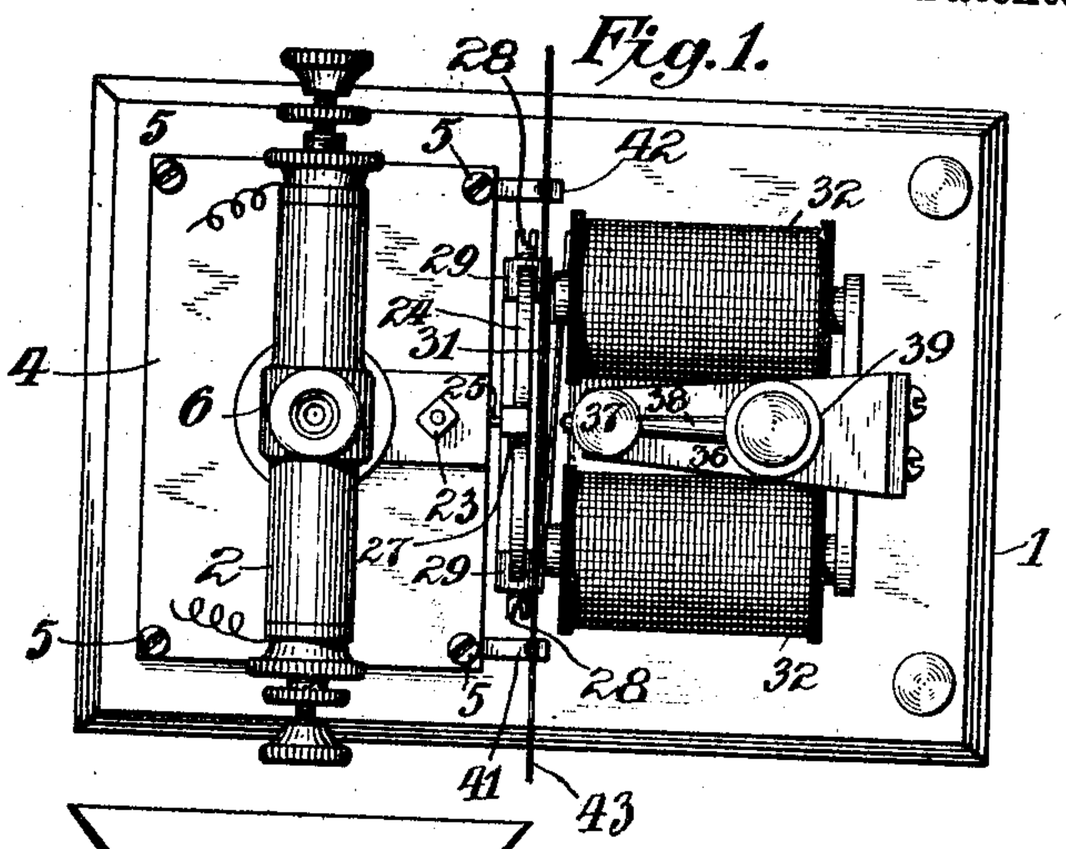


Fig. 2.

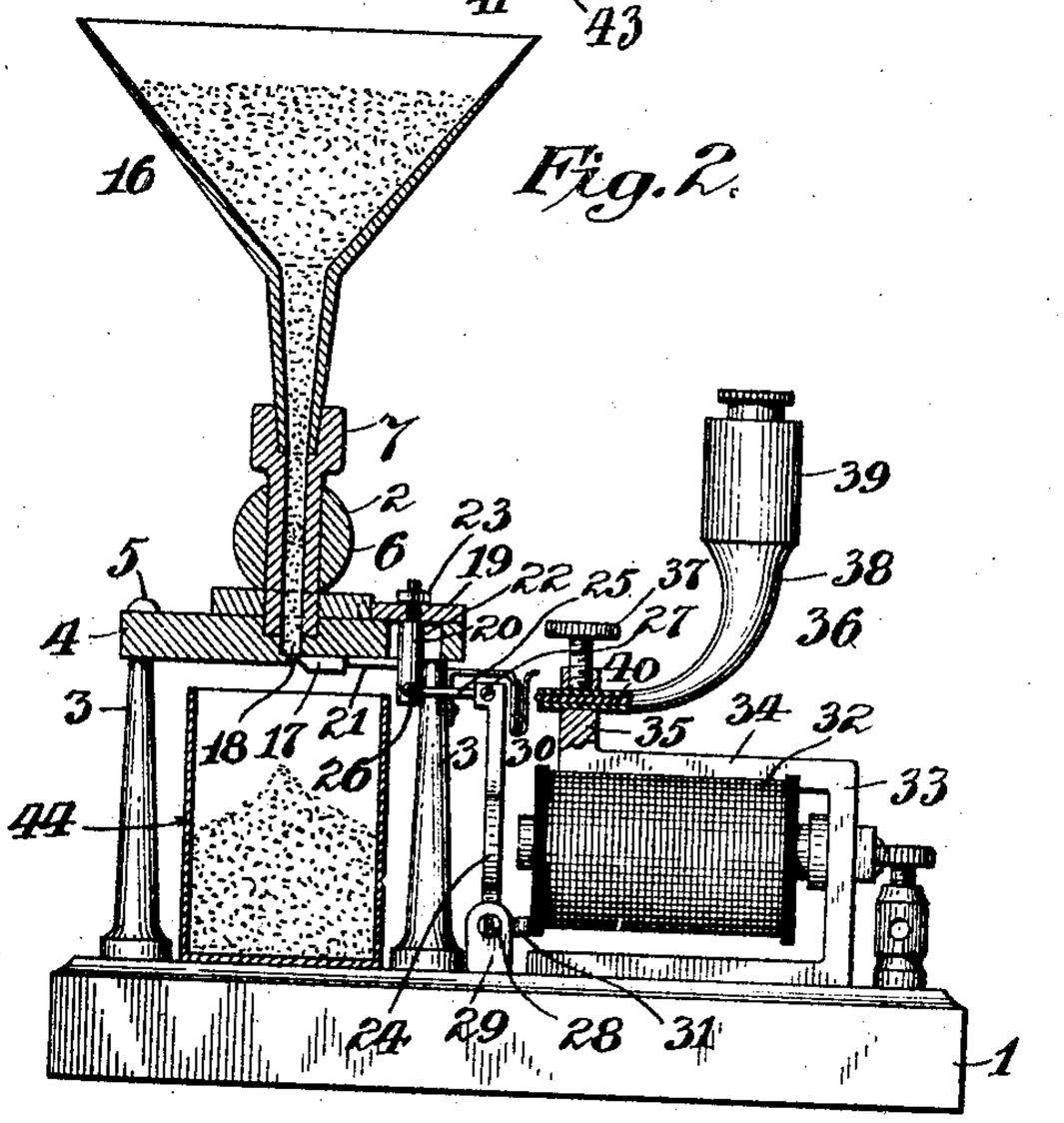
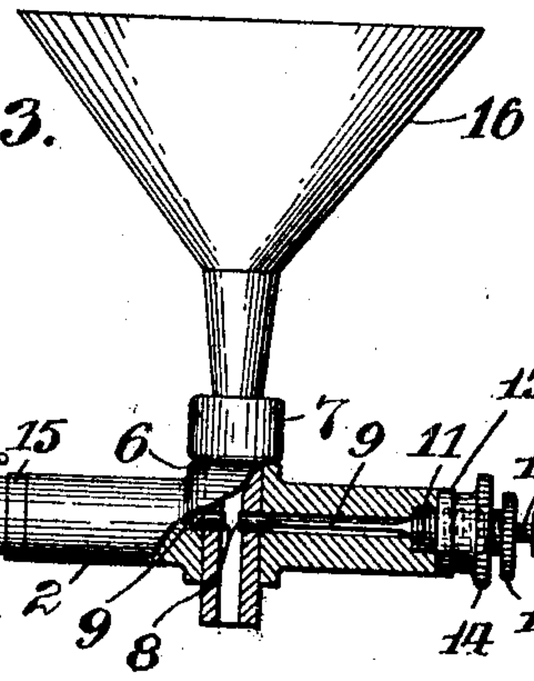


Fig. 3.



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2 SHEETS—SHEET 2.

Fig. 4.

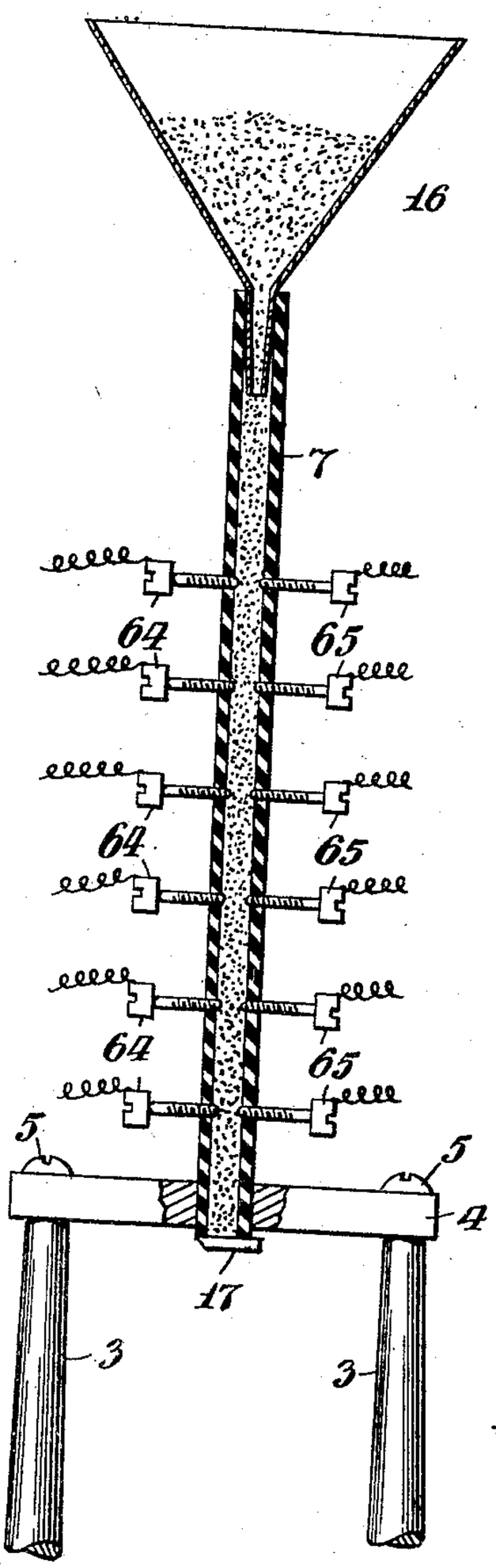
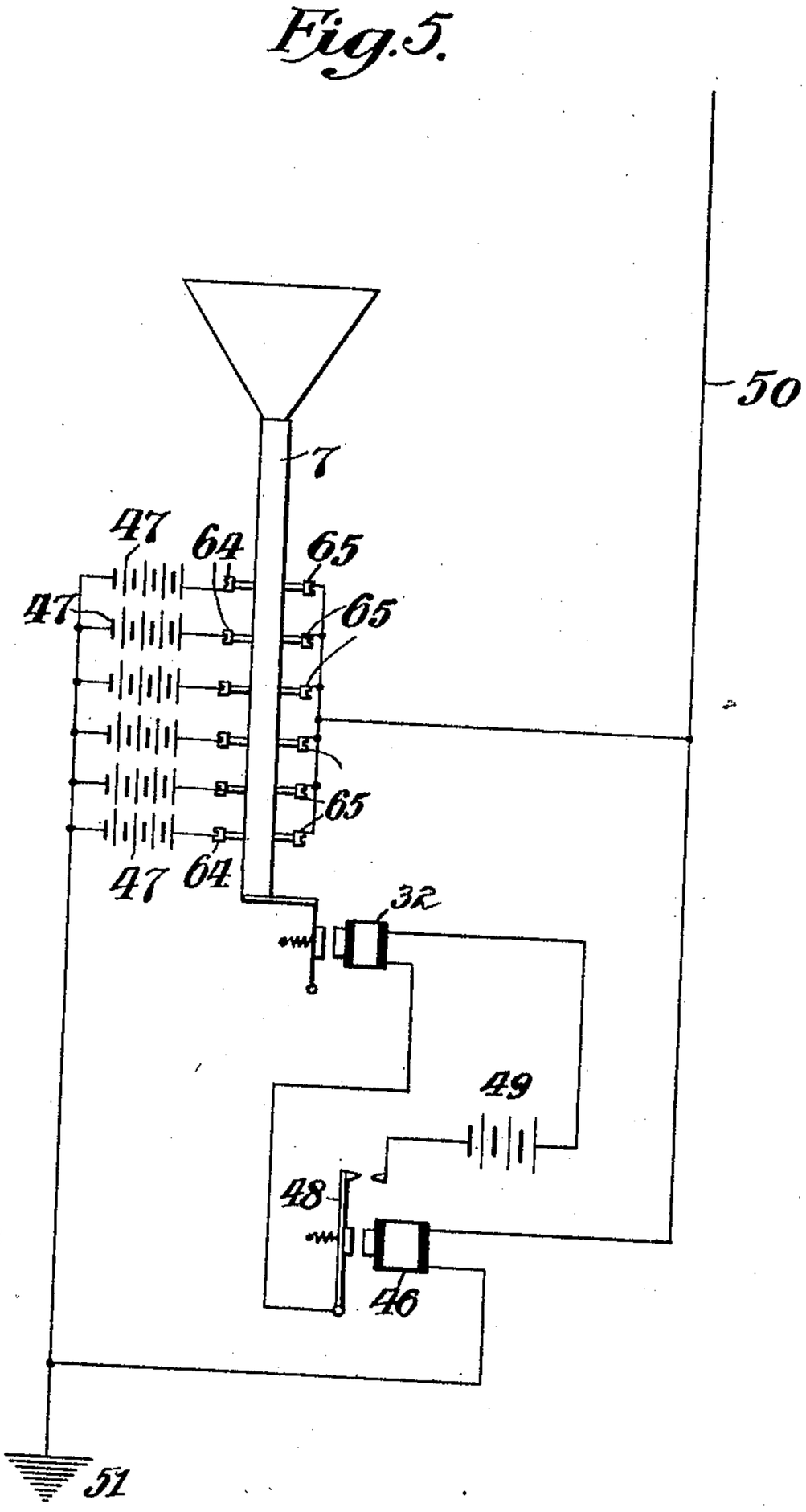


Fig. 5.



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UNITED STATES PATENT OFFICE.

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COHERER.

993,024. Specification of Letters Patent. Patented May 23, 1911.

Application filed October 29, 1906. Serial No. 341 029.

To all whom it may concern:

Be it known that I, EDWARD J. BURKE, a citizen of the United States, and a resident of the borough of Brooklyn, city of New York, State of New York, have invented new and useful Improvements in Coherers, of which the following is a specification.

My invention more particularly relates to that class of responders or receivers used in wireless telegraphy whereby the oscillatory discharges which attend the transmission of signals by means of Hertzian waves or other electric waves or variations are detected and made use of for reproducing at a distance the signals so transmitted.

In my improved coherer I preferably employ substances which are susceptible of coherence under the action and stress of high potentials such as are at present employed in wireless telegraphy. There are many such substances well known in the art and the selection to be made may depend upon special conditions and the varying circumstances that are found to affect favorably or unfavorably the wireless transmission of signals. For general purposes I find in practice that granulated carbon gives very satisfactory results and I find it well adapted for use in my improved coherer.

Heretofore, as is well known, it has been found that coherers in which metallic or other powder adapted by their special differing degrees of conductivity under differing degrees of coherence have after a brief period of use become inoperative because of the deterioration of the individual particles of the powder in the coherer or from imperfect decoherence. As a result the use of coherers in which powder of any kind is used have been to a great extent abandoned in wireless telegraphy and as a consequence wireless telegraph signals are at present almost universally received through telephone receivers actuated by local batteries of small potential varied through some delicate detector of which there are several well known in the art. The signals received in this way are unsatisfactory, unreliable and unfitted for commercial purposes because of the great liability to errors attending their use, no permanent record of the signals being practicable.

In my improved coherer all the objections attending other coherers in the matter of the deterioration of the cohering particles by use, are entirely removed as also all difficulties resulting from imperfect decoherence. I am, therefore, enabled not only to reproduce wireless signals by sound but also to record the same on an ordinary recording paper tape as in ordinary telegraphy or to relay the signals from one receiving wireless station to another either by wireless means or over a land line by ordinary telegraphic means.

By my improved coherer I am enabled to use locally on the coherer electric currents having a much higher potential and of a larger amperage than have heretofore been possible with coherers and to obtain a greater positiveness of the signals and to produce many desirable effects not possible with weak electric currents.

Heretofore in coherers in which powder or metallic filings have been employed decoherence of the particles depended entirely upon a more or less vigorous shaking of the particles therein, usually by tapping the coherer. This is done by means of a local current passing through the coherer, varied by the action of the received oscillations or waves, the current operating a delicate relay which relay controls another local battery having in its circuit an electromagnetic tapper or shaker. In my improved coherer I neither tap nor shake the coherer nor the particles therein but by each action of a received operative wave or oscillation I bodily remove by the means I employ the substance cohered and replace such removed cohered substance by fresh material so that every incoming wave or oscillation has fresh material to act on. In this way every received wave finds the coherable particles practically fresh and unaffected by previous use and consequently in a normally constant state of uniform condition of highest efficiency. Because of this replacement of the particles of coherence after each signal operation it is obvious that the action of the local battery through the coherable particles will cause little or no deterioration of the particles and that a larger battery may therefore be employed without any detrimental effects on the coherer. Less delicate relays may therefore be employed and the fine adjustments now attending relays used in connection with coherers in receiving wireless signals thus avoided.

The invention consists in features illus-

trated in the drawings and set forth in the following description and modifications thereof and which are covered by or included in the claims.

Referring to the drawings Figure 1 illustrates a top view of the device embodying my invention. Fig. 2 illustrates a vertical sectional view of the device. Fig. 3 is a detailed view of a part of the device showing the cohering chamber and the electrodes. Fig. 4 is a sectional view of a modification of my invention. Fig. 5 is a diagram showing the connections of the modification shown in Fig. 4, with a wireless system.

Referring now to the drawings I shall describe the construction and arrangement of the parts of my improved coherer more in detail.

1 is the supporting base of the instrument embodying my invention.

2 is a cylindrical body made of insulating material, such as vulcanite. The cylindrical body 2 is supported on the base by means of posts 3, 3 and a platform 4. The platform 4 is attached to the posts 3, 3 by means of screws 5, 5. The body 2 is provided with an enlarged portion 6 located in the center thereof. The enlarged portion is adapted to receive the shell 7 which is also made of an insulating material. The shell 7 fits into and passes through the body 2 and is secured in the platform 4. By this means the body 2 is also secured to the platform 4. The shell 7 has a transverse channel or hole which registers with a central bore in the cylindrical body 2. The body 2 also contains the electrodes or terminal contacts which are connected to or form a part of two rods 9 located in the body 2. The terminals 8, 8 fit snugly in the hole of the body 2. The terminals or electrodes are located in the vicinity of each other, the space between them constituting the chamber in which the particles of coherable material are cohered.

The outer ends 10, 10 of the rods are screw threaded and pass through shells 11, 11 which are located in the ends of the cylindrical body 2. Milled heads 12, 12 are attached to the outer ends of the rods whereby the rods may be screwed in and out of the shells 11, 11 and the space between the terminals or the size of the cohering chamber may be adjusted. The distance between the terminals may thus be adjusted as desired. Lock-nuts 13, 13 are located on the screw threaded portions of the rods and are adapted to be screwed against the ends of the shells 11, 11. By this means the rods and the terminals may be locked in their adjusted positions. The outside of the shells 11, 11 are also provided with threads on which thumb-nuts 14, 14 are screwed. The thumb nuts 14, 14 may be screwed against the reinforcing collars 15, 15 located on and covering the ends of the cylindrical body 2. Electric conductors may be secured between the thumb nuts 14, 14 and the collars 15, 15. By this means the electrodes or terminals 8, 8 may be connected in an electric circuit.

To the shell 7 and the cohering chamber is connected a receptacle for containing a material used as a variable resistance in the art of wireless telegraphy. Any material that is suitable for this purpose may be used, such as carbon granules. The receptacle for containing the material may be of any suitable form. I have illustrated a funnel or hopper 16 which is supported by the shell 7. The material passes from the receptacle or funnel 16 through the shell 7 and between the terminals 8, 8, that is, to and through the cohering chamber to the end of the shell 7.

The cohering material is controlled by a slide valve which operates to close and open the lower end of the shell 7 and to allow the material to pass through the cohering chamber and through the exit of the shell. The slide valve 17 is located under the platform 4 and moves along its lower surface and is adapted to close the outlet 18. The valve 17 is guided by a small plate 19 and a pin 20 attached thereto. The plate 19 rests on the platform 4 and is attached to the valve 17 by means of the pin 20 and the rod 21. The plate 19 is secured to the pin 20 by means of a nut 23. The pin 20 moves in a slot 22 formed in the platform 4. The valve 17 is operated by means of a magnet.

The pin 20 which is attached to the valve 17 is connected to the armature 24 by a link 25 and an arm 30 extending upward from the armature 24. The link 25 is attached to the pin 20 and to the arm 30 by pivot pins 26 and 27. The armature is supported by fulcrum points 28, 28 located in uprights 29, 29 supported on the base 1. A spring 31 operates on the armature 24 to push it to the left and away from the magnet 32 and to keep the slide valve 17 closed, the spring 31 being attached to the armature and pressing against one end of one of the spools of the magnet 32. When the magnet is energized the slide valve is pulled to the right and the outlet 18 is opened.

The magnet 32 is supported in the frame 33 and on the base 1. The frame 33 has an arm 34 which extends over the top of the magnet 32. To the arm 34 is secured an upright or post 35. The post 35 may be a right angular portion of the arm 34. In the post 35 is secured a marker 36 by means of the screw 37. The marker that I have shown comprises a tube 38 and a font 39 for ink. An absorbent substance 40 is located within the lower end of the tube and assists in regulating the flow of the ink to the end of the tube.

Clips 41 and 42 are supported on two posts 3, 3 and are adapted to receive and guide tape or ribbon 43. An arm 30 of the armature 24 extends upward to a point opposite the lower end of the marker 36. The clips 41 and 42 are adapted to guide the ribbon between the upper end of the arm 30 and the marker 36. When the armature is moved by the magnet 32 the arm strikes the ribbon 43 and presses it against the marker and a mark or record is made. Also when the magnet 32 is energized the armature 24 is drawn toward it and the slide valve 17 is operated and the exit 18 is opened in response to an electric impulse. The marker may be adjusted and secured at any point in the post 35 by means of the screw 37. By this means the extent of the movement of the armature may be adjusted and consequently the amount of the opening produced by the shifting of the slide valve may also be regulated.

A receptacle 44 is located below the nozzle or opening 18 to receive the material after it is removed from the cohering chamber. As each impulse is received the cohered material contained in the chamber and which was cohered by the impulse drops bodily downward and finally into the receptacle 44.

In Figs. 4 and 5 I have shown a modification of the invention. In the modification a plurality of pairs of terminals are used to multiply the effect of a received impulse. Fig. 4 shows the modified portion of the device mounted on the platform 4. The shell 7, which in the modification is much longer, is inserted in a hole in the platform 4. A plurality of terminals 64 and 65 are located in the shell 7, the terminals 64 being located opposite the terminals 65. The terminals 64 and 65 are screw threaded and are adapted to be screwed to the shell 7. Wires are attached to the terminals 64 and 65 for connecting the terminals with each other or in external circuits. A receptacle is connected with the interior of the shell 7. I have shown a funnel 16 which is mounted in the upper end of the shell 7. The receptacle 16 contains the variable resistance material and is adapted to feed the same into the shell and between the spaces formed between the terminals 64 and 65. The lower end of the shell 7 is closed by means of the slide valve 17 which operates in the same way that the slide valve shown in Fig. 2 operates. The slide valve 17 allows the material to pass through the spaces or chambers between the ends of the terminals or electrodes 64 and 65 as the material is cohered.

In Fig. 5 I have illustrated the way in which the modification can be used to magnify the impulses received by the antennæ. The terminals 65 are connected together and each terminal 64 is connected to a battery 47. By this means a plurality of batteries can be used without destroying the coherable property of the material. The batteries 47 are all connected together and to the relay 46. A local circuit is thus formed through the batteries and the multiple coherer and the relay 46. The relay 46 operates upon its armature 48 and closes the circuit of the battery 49 in the manner described in connection with Fig. 7. As magnet 32 is operated the valve 17 is pulled to one side and the outlet of the shell 7 is open. Some of the material is removed from the shell and the rest of it is moved downward toward the outlet and new material takes the place of the cohered material which was cohered by the received impulse. A much stronger current can then be used in connection with the coherer and a less delicate relay 46 may be used for closing the circuit of the valve controlling magnet and operating the recorder.

The invention can be applied to any form of a wireless system or to any form of an electrical system which is used for the transmission of electrical impulses.

The different features of the invention may be modified by those skilled in the art without in any way altering the essence of the invention or departing from the spirit thereof.

What I claim as new and desire to secure by Letters Patent is as follows:

1. In a coherer the combination of a plurality of terminals, a coherable material, means for feeding the said coherable material to and through the said coherer, means for discontinuing the feeding of the said material while the impulses are not received.

2. In a coherer the combination of a plurality of terminals, a coherable material, means for causing the said coherable material to pass between the said terminals continuously in one direction and means for stopping the said movement of the said material.

3. In a coherer the combination of the body of the coherer, terminals located within the said body, means for adjusting the said terminals, a coherable material, a means for feeding the said coherable material through the space between and away from the said terminals, automatic means for controlling the movement of the said material after each operation of the coherer.

4. In a coherer the combination of the body of the coherer, terminals located within the said body, a coherable material, means for feeding the said coherable material through the space between the said terminals, and an adjustable means for controlling the movement of the said material through the said coherer.

5. In a coherer the combination of the body of the coherer, a coherable material,

adjustable terminals located with the said body, means for feeding the said coherable material into the space between the said terminals and through the body of the coherer and an adjustable means for causing the material to pass between the said terminals as each signal is received.

6. In a telegraphic device the combination of a coherer, coherable material, an electric controlling means for controlling the coherable material and causing it to be displaced by other material and a recorder operated by the said electric controlling means.

7. In a telegraphic device the combination of a coherer, a recorder, a coherable material, a means operated by the recorder for removing a portion of the cohered material after each operative impulse.

8. In a telegraphic device the combination of a coherable material, a recorder, a means connected to the said recorder for causing the removal of the material as it is cohered upon the operation of the said recorder.

9. In a telegraphic device the combination of a coherer, a recorder, a coherable material, adjustable terminals located in the said coherer, adjustable means for regulating the movement of the said material, means for causing the cohered material to be replaced by a coherable material upon the operation of the said recorder.

10. In a coherer the combination of the body of the coherer, a coherable material adapted to be fed through the said body of the coherer, an electro-magnet adapted to control the movement of the coherable material to and the cohered material away from the said body of the coherer.

11. In a coherer the combination of a plurality of pairs of terminals, a variable resistance material, a means for causing the material to move between the said pairs of terminals one after the other.

12. In a coherer the combination of a shell, a variable resistance material located in the said shell and a plurality of pairs of terminals located along the said shell and means for causing the said material to pass the length of the shell and between the said pairs of terminals consecutively.

13. In a coherer the combination of a plurality of pairs of terminals, a variable resistance material located between the said terminals, a plurality of batteries, one of said batteries connected to one of each pair of the said terminals, an antenna connected to another set of the said terminals, a magnet connected to the said antenna and to the said batteries and means controlled by the said magnet for reproducing an impulse received by the antenna.

14. In a coherer a cohering chamber normally filled with coherable material, a larger chamber containing coherable material, means for releasing and removing the material from the said cohering chamber and means for refilling it with other coherable material from the said larger chamber.

15. In a coherer the combination of a terminal, a body for containing coherable material, the said coherable material adapted to pass in juxtaposition to the said terminal, and means for stopping the said material while portions of it are being cohered.

16. In a coherer the combination of a body of the coherable material and means for automatically causing portions of the material to move through the body of the coherer step by step as the said portions are cohered.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

EDWARD J. BURKE.

Witnesses:
CHARLES J. BURKE,
FAUST F. CRAMPTON.