

C. BERGER.

CONTROLLING FROM A DISTANT POINT THE OPERATION OF A MECHANISM OR INSTRUMENT.

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1,055,985.

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Fig. 1.

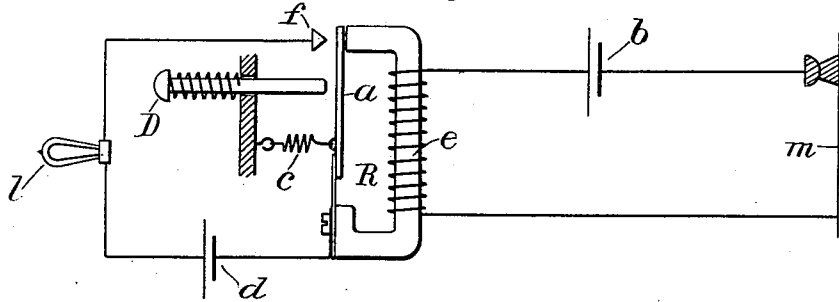
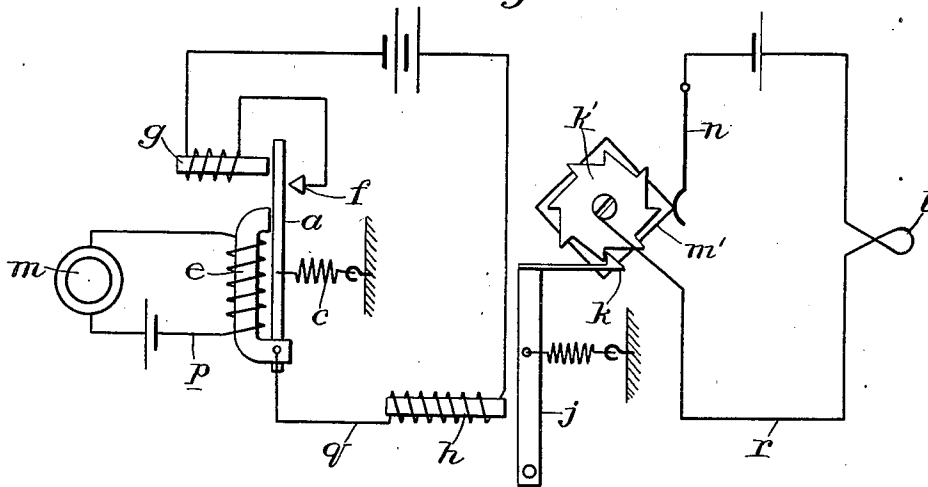


Fig. 2.



Witnesses:
W. Martin
E. B. King

Inventor,
Christian Berger
By his Attorneys,
Rogers, Kennedy & Campbell.

UNITED STATES PATENT OFFICE.

CHRISTIAN BERGER, OF BUDAPEST, AUSTRIA-HUNGARY, ASSIGNOR TO SUBMARINE WIRELESS COMPANY, A CORPORATION OF NEW YORK.

CONTROLLING FROM A DISTANT POINT THE OPERATION OF A MECHANISM OR INSTRUMENT.

1,055,985.

Specification of Letters Patent.

Patented Mar. 11, 1913.

Application filed August 26, 1909. Serial No. 514,762.

To all whom it may concern:

Be it known that I, CHRISTIAN BERGER, a subject of the King of Hungary, residing at Budapest, in Austria-Hungary, have invented certain new and useful Improvements in Controlling from a Distant Point the Operation of a Mechanism or Instrument, of which the following is a specification.

This invention relates to the controlling from a distant point the operation of a mechanism or instrument.

One of the main objects hereof is to permit the control of a given operation by means of sound waves or similar air pulsations created at a distant point; for example, according hereto one might, by whistling or clapping the hands at one point in a room, cause the operation of a toy or the lighting of a light or similar operation at another part of the room.

Other and more specific objects will appear in the hereinafter following description.

According hereto the operation of controlling from a distant point the operation of a mechanism or instrument consists substantially in creating at the distant point the pulsations or sound waves in air or other fluid, receiving the same at the place of location of the mechanism or instrument by means of a sensitive device such as a microphone which is adapted to change or decrease the normal current in an electrical circuit, causing the current in such circuit to flow through a magnet coil having an armature connected to or forming part of the mechanism or instrument to be controlled, and providing for such armature a force tending to withdraw it from said magnet, such force being inoperative under normal current conditions and insufficient to withdraw the armature, but operative and sufficient to withdraw the armature with the decreased current due to the effect of the air pulsations on the microphone. Preferably the normal current is insufficient to cause the return of the armature when withdrawn, so that when the armature is released it is beyond the power of the magnet coil to restore it.

The apparatus which I prefer for carrying out the present invention comprises the

three following elements in a combination: First, a microphone circuit containing a microphone which will be sensitive to sound waves or like pulsations received from the distant point, and the microphone being adapted when affected by pulsations to modify the normal electric current in such circuit. Second, an electro-magnet adapted to have its magnetic pull modified through the modification of current in said circuit. Third, a shiftable part such as an armature, so arranged and fitted as to shift when said magnet is modified from a first position to a second position, the first position being preferably within the operative influence of the magnet and the second position beyond such influence.

With such apparatus the effect of the sound waves on the microphone is to increase the resistance and cause a fall of current in the circuit so that an electro-magnet in the circuit is weakened, owing to which the armature previously held by the magnet is released so that gravity or a spring may cause the armature's shifting and so that in turn the shifting of the armature may bring about the operation of the mechanism or instrument to be controlled. Preferably the shifting of the armature will be employed to close a second circuit through which the desired control and operation are effected.

Experiments have shown that if the magnet can again attract its armature by means of the restored current when the sound action ceases, and thus bring it again into original position ready for working, the result is unsatisfactory as compared with my preferred form. The strength of the current as well as the resistance of the microphone, are subject to various fluctuations. For instance, the extent of the increase of resistance in the microphone when sound action takes place, as well as the decrease of resistance after the cessation of the sound action, are not constant, so that the strength of current does not always decrease to the same extent, and, therefore, does not always return to the original value. Accordingly, when the counter force of the spring is once adjusted, in many cases the fall of current produced by the sound action, is so small that the force of the spring is no longer sufficient to pull off the armature, and in

some cases the increase of current which takes place after the ceasing of the sound action, is not sufficiently strong to attract again the armature which has been pulled off. On the other hand, when the counter force is very finely adjusted, and the extent of movement of the armature is small, the contact made by the latter is an imperfect one, owing to the slight preponderance of the counter force. For obviating these disadvantages, according to the described embodiment of this invention, the armature adheres to the magnet when the microphone is at rest, and the conditions of current are calculated so that in the position of rest, the strength of current in the microphone circuit should not be sufficient for again attracting the armature, the re-setting of the latter being effected by separate resetting parts, operated by hand or automatically. The adjustment of the device can then be effected in a more accurate manner, and the device is much less affected by changes in the microphone resistance and in the strength of current whereby the reliability of working of the device is greatly increased.

I will first describe and illustrate more or less diagrammatically one or more forms in which the present improvements may be embodied, and will afterward point out in the claims the features of novelty.

In the accompanying drawings, Figure 1 shows a simple form of embodiment of the present invention in which the shifting armature is returned by hand. Fig. 2 shows the diagram of an embodiment providing for automatic return of the armature, and in which a third current circuit, the real working circuit, is operated by a second current circuit.

In a single circuit are the battery *b*, the microphone *m*, and the coil *c* of electro-magnet *R* which, in the position of rest of the device, keeps its armature *a* attracted in opposition to the action of the spring *c*. When the microphone is struck by sound waves or other vibrations, the armature *a* is pulled off by the spring *c* and, in the construction illustrated, closes the circuit of the lamp *l* at the contact *f*. By reason of this movement of the armature devices of many kinds, such as toys, lighting devices, signaling apparatus and the like, can be operated. After the cessation of the sound action, it may be desired that the operating circuit, in the present case that of the lamp *l*, be broken again and the armature brought back to the magnet. This in the present example, is effected by pressure upon a bar *D*, which yields, and which pushes the armature back to original position.

In order to enable the armature's return to be automatically accomplished, a separate return electro-magnet could be inserted into

the operating circuit, and on the said circuit being closed, would bring the armature back to its electro-magnet and at the same time break the operating circuit. Such an arrangement is shown in the construction in Fig. 2 in which *g* is the return electro-magnet. Owing to the instantaneous breaking of the operating circuit *g* by the return electro-magnet, only a brief or single current impulse is sent into the operating circuit at each operation of the sound impulses, the said impulse being further utilized if desired by means of suitable devices. In the construction shown in Fig. 2, this current impulse operates an electro-magnet *h* and its armature *j* constituting part of an electro-magnet switch which switches then in a third circuit, the real working circuit *r*. Into the third circuit *r* can be connected, for instance, an incandescent lamp, an electric motor or any other device *z*. If the armature *j*, normally held back by its spring, is attracted by a current impulse in the circuit *r* its end, formed into a hook or pawl *k* moves a ratchet or notched wheel *k'* to the extent of one division, and in that way throws into or out of contact the switch parts *m'*, *n* of well known kind. The switch shown in the present case comprises a square contact plate *m'* carried by wheel *m*, and the corners of which engage, when the plate is revolved, with the contact spring *n*. The circuit *r* leads to the pivot of the plate *m'* which has the ratchet disk *k* rigidly connected thereto; and the current returns through spring *n* when a corner of *m'* is engaged therewith.

The microphone can be excited in an equally successful manner both by harmonic oscillations and by sudden sounds, as well as by mechanical vibrations such as hammering, etc.

For the purpose of preventing any sound waves, excepting of a certain predetermined pitch, from acting on the microphone, the latter can be provided with a tuned diaphragm, or interchangeable diaphragms of different responsiveness can be used. These do not need to be specifically illustrated since tuned microphones are already known, and the microphones *m*, *m*, in the drawings may be considered as such. By this, a sound, for example a whistle, of a given pitch, may operate the mechanism or instrument (lamp circuit, or toy, etc.) whereas a whistle of another pitch would be of no effect.

It will be seen that by the above described and illustrated embodiments I have accomplished the advantages and objects hereinbefore referred to, and other advantages and functions will be apparent to those acquainted with the subject.

Since many specific features of arrangement, combination and detail shown herein

may be varied without departing from the main principles, I do not intend to restrict myself thereto, excepting so far as specified respectively in the appended claims.

What I claim as my invention and desire to secure by Letters Patent is:—

1. In apparatus for the wireless operation of switches and other apparatus from a distance by sound waves and other vibrations the combination of an electric circuit a source of current, a microphone and an electromagnetic relay in said circuit, an armature to said relay adhering to the relay magnet in the state of rest of the microphone, a second electric circuit including said armature, a source of current therefor and an indicating device operable thereby and a spring adapted to pull said armature from the relay magnet and to close the second circuit when the current in the microphone circuit is weakened by sound waves or other vibrations, the conditions in the microphone circuit as well as the strength of the spring acting on the relay armature being calculated so that the strength of the current circulating in the microphone circuit when the microphone is at rest is not sufficient for attracting again the armature pulled away, and means distinct from said relay magnet for returning the armature to the magnet.

2. In an apparatus of the character described the combination of an electric circuit, a source of current, a microphone, and an electromagnetic relay in said circuit, an armature to said relay, a second electric circuit including said armature, a source of current therefor, and an indicating device operated thereby, a spring adapted to pull said armature from the relay magnet and to close the second circuit when the current in the microphone circuit is weakened by sound waves or other vibrations, and an auxiliary electromagnet in said second circuit adapted to return said armature to the relay magnet when the second circuit is closed.

3. In an apparatus of the character described, the combination of an electric circuit, a source of current, a microphone, and an electromagnetic relay in said circuit, an armature to said relay, a second electric circuit including said armature, a source of current therefor and an electromagnetic switch adapted to be operated by said second circuit, means for pulling said armature from the relay magnet and for closing the second circuit when the current in the microphone circuit is weakened by sound waves or other vibrations, and means distinct from said relay magnet for returning the armature to the magnet controlled by said second circuit.

4. In an apparatus of the character described the combination of a circuit containing a microphone, electromagnetic relay in said circuit, an armature to said relay, a

second electric circuit including said armature, a source of current therefor, and an electromagnetic switch adapted to be operated by said second circuit and comprising an electromagnet connected in said second circuit, an armature for said electromagnet, and a pawl carried by said armature, a spring acting in opposition to the switch electromagnet, a ratchet wheel adapted to operate any desired indicating device, said wheel being rotated by said pawl, a spring adapted to pull the armature from the relay magnet and to close the second circuit when the current in the microphone circuit is weakened by sound waves or other vibrations, and an auxiliary electromagnet in said second circuit adapted to return said armature to the relay magnet when the second circuit is closed.

5. Apparatus for controlling from a distant point the operation of a mechanism or instrument, comprising, in combination, a microphone circuit containing a microphone sensitive to sound waves or like pulsations received from the distant point, said microphone adapted when affected by pulsations to modify the normal electric current in said circuit, an electro-magnet adapted to have its magnetic pull modified through the modification of current in said circuit, and a shiftable armature or part so arranged and fitted as to shift, when said magnet is modified, from a first position within the operative influence of said magnet to a second position beyond the operative influence thereof.

6. Apparatus for controlling from a distant point the operation of a mechanism or instrument, comprising, in combination, a microphone circuit containing a microphone sensitive to sound waves or like pulsations received from the distant point, said microphone adapted when affected by pulsations to modify the normal electric current in said circuit, an electro-magnet adapted to have its magnetic pull modified through the modification of current in said circuit, and a shiftable armature or part so arranged and fitted as to shift, when said magnet is modified, from a first position within the operative influence of said magnet to a second position beyond the operative influence thereof, and means other than said magnet for causing the restoration of said armature to first position.

7. Apparatus for controlling from a distant point the operation of a mechanism or instrument, comprising, in combination, a microphone circuit containing a microphone sensitive to sound waves or like pulsations received from the distant point, said microphone adapted when affected by pulsations to modify the normal electric current in said circuit, an electro-magnet adapted to have its magnetic pull modified through the

modification of current in said circuit, and a shiftable armature or part so arranged and fitted as to shift, when said magnet is modified, from a first position within the operative influence of said magnet to a second position beyond the operative influence thereof, and means other than said magnet for causing the restoration of said armature to first position automatically after each movement of the same.

8. Apparatus for controlling from a distant point the operation of a mechanism or instrument, comprising, in combination, a microphone circuit containing a tuned microphone sensitive to sound waves or like pulsations of a given frequency received from the distant point, said microphone

adapted when affected by pulsations to modify the normal electric current in said circuit, an electro-magnet adapted to have its magnetic pull modified through the modification of current in said circuit, and a shiftable armature or part so arranged and fitted as to shift, when said magnet is modified, from a first position within the operative influence of said magnet to a second position beyond the operative influence thereof.

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

CHRISTIAN BERGER.

Witnesses:

ARTHUR B. SINGER,
MICHAEL FONIOR.