July 16 1923. 1,461,568

C. ADAMS-RANDALL

TELEGRAPHIC RECEIVING INSTRUMENT

Filed Sept. 27, 1920 2 Sheets-Sheet 1

Fig. 1.

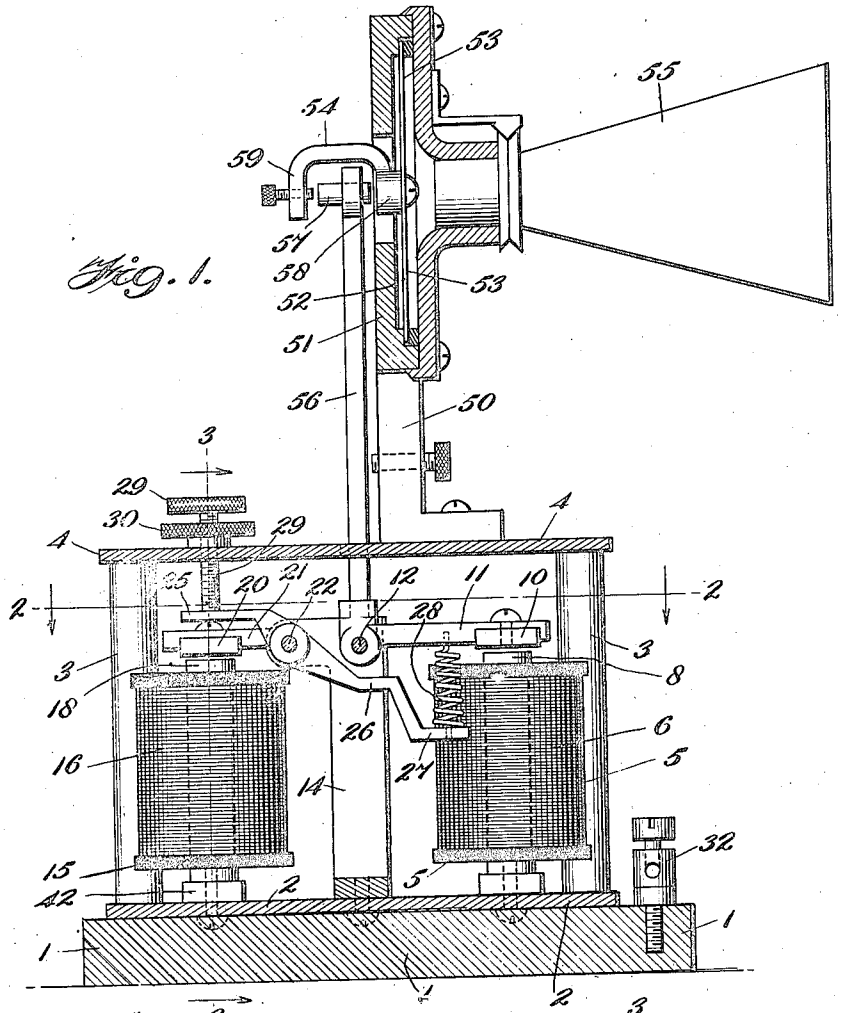
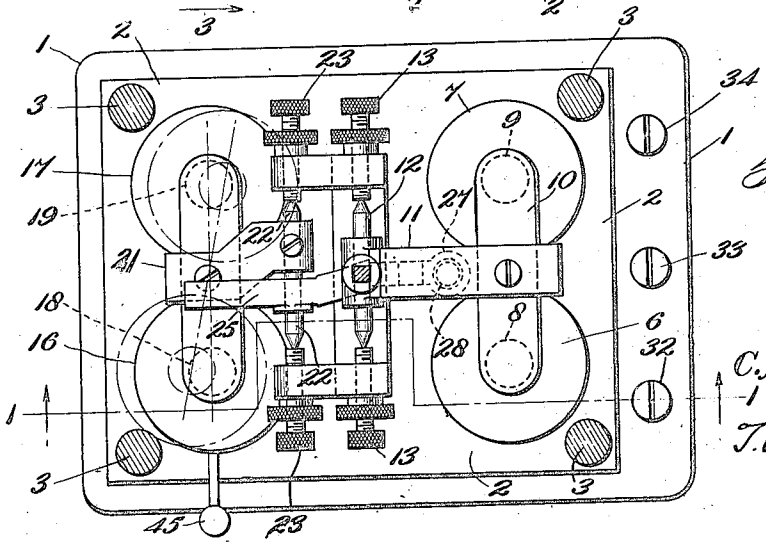


Fig. 2.



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July 10, 1923. 1,461,568

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Fig. 3.

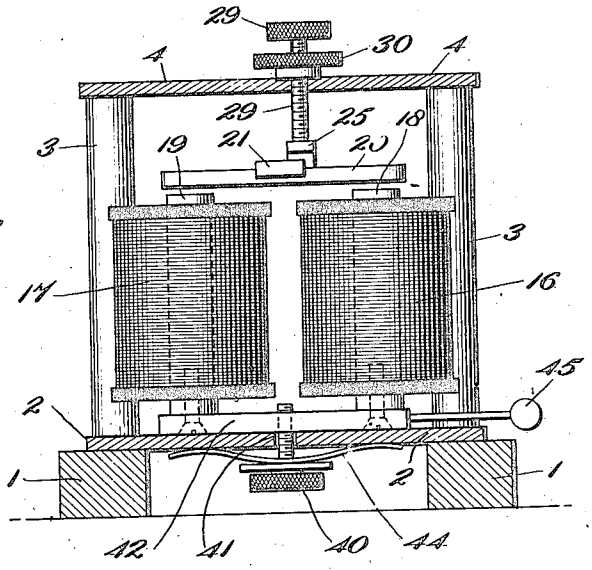


Fig. 4.

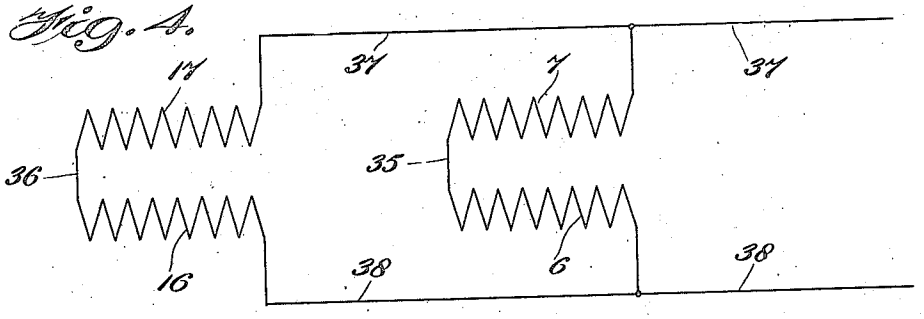
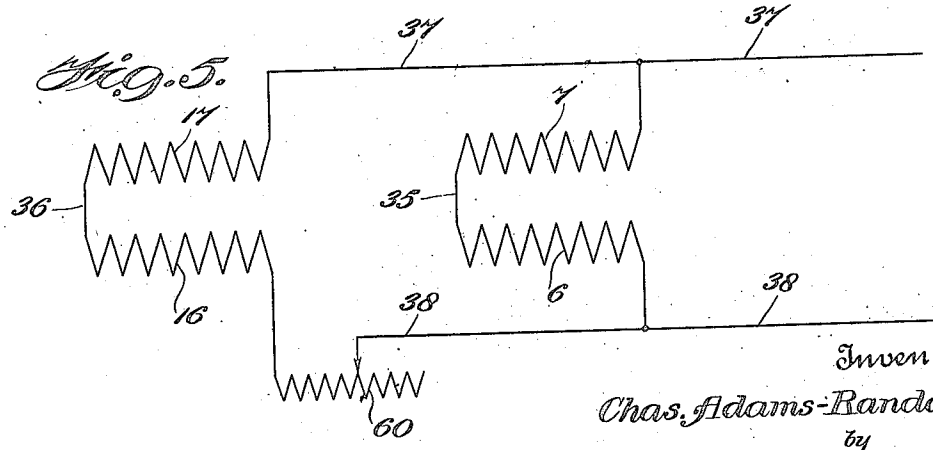


Fig. 5.



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UNITED STATES PATENT OFFICE.

CHARLES ADAMS-RANDALL, OF NEW YORK, N. Y.

TELEGRAPHIC RECEIVING INSTRUMENT.

Application filed September 27, 1920. Serial No. 412,944.

To all whom it may concern:

Be it known that I, CHARLES ADAMS-RANDALL, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Telegraphic Receiving Instruments; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to telegraphic receiving instruments and has for its object to produce a device of this character which will be simple in construction, comparatively inexpensive to manufacture, and more efficient in action than those heretofore proposed.

A further object of the invention is the production of an instrument of this character which may be operated directly on the main line circuit, without the use of the usual relay, local battery and local circuits; and which will be entirely automatic or self-adjusting, in that when adjusted for use upon a maximum distance circuit, it does not require manual readjustment if used upon fractional parts of such circuit.

With these and other objects in view, the invention consists in the novel details of construction and combination of parts more fully hereinafter disclosed and particularly pointed out in the claims.

Referring to the accompanying drawings forming a part of this specification, in which like numerals designate like parts in all the views:

Figure 1 is a diagrammatic vertical sectional view of an instrument made in accordance with the present invention, taken approximately on the line 1—1 of Figure 2;

Figure 2 is a diagrammatic horizontal sectional view of a portion of the parts shown in Figure 1, taken approximately on the line 2—2 of said figure;

Figure 3 is a vertical sectional view of the parts shown in Figure 1, taken approximately on the line 3—3 of the said figure and looking in the direction of the arrows;

Figure 4 is a diagrammatic view illustrating one form of electrical circuits and connections which may be employed with this instrument; and

Figure 5 is a diagrammatic view of a slightly modified form of circuit

1 indicates a base of wood, hard rubber, or other suitable material, to which is suitably secured a plate 2 of metal and rigid with the said plate 2 are a plurality of uprights 3 arranged substantially at the corners of the said plate and supporting at their upper ends a second plate 4, as will be clear from the drawings. Preferably rigid with the plate 2 is an electromagnet 5 comprising the coils 6 and 7, each having the pole pieces 8 and 9 respectively; and associated with the said pole pieces is an armature 10 carried by and rigid with the lever 11, which is mounted upon the shaft 12 pivotally supported by the adjustable members 13 carried by the U-shaped support 14, also rigid with the plate 2.

A second or auxiliary electromagnet 15 is mounted on the said plate 2 at its opposite end for a purpose to be presently described, and comprises the coils 16 and 17 having the pole pieces 18 and 19. An armature 20 is associated with these said pole pieces and is carried by a lever 21 mounted upon the shaft 22 pivoted in the adjustable members 23 also carried by the said support 14, as will be clear from Figures 1 and 2.

The said shaft 22 also carries to one side of the said lever 21 a second lever 25 having an extension 26 extending downwardly and to the right, as seen in Figures 1 and 2, underneath the lever 11. The said extension 26 is provided at its end with an enlargement 27 upon which rests one end of a spiral or other compression spring 28, the other end of which is suitably secured to the lever 11 as will readily appear from Figure 1. A suitable adjusting screw 29 provided with a lock nut 30 and adapted to control the lever 25, is screw threaded into the plate 4 (see Figures 1 and 3).

32, 33, and 34 indicate binding posts carried by the base 1, and suitably connected to the electromagnets 5 and 15 by wiring, not shown. The coils 6 and 7 of the magnet 5 are joined in series in the usual manner as by the wire 35, Fig. 4, and in like manner the coils 16 and 17 of the magnet 15 are joined in series as by the wire 36. The two sets of coils are then preferably connected to the line wires 37 and 38 in parallel, as shown in said figure, and they are thus simultaneously and substantially equally energized by the main line current impulses.

As will appear more fully below it is desirable to control the effective magnetic attraction of the magnet 15 upon its armature 20, and to this end the said magnet may be pivotally connected to the base member 2, as by the screw 40, passing through the opening 41 in the said member 2, and taking into the yoke 42 of the said magnet 15, see Figure 3. A spring 44 may be associated with these parts, as shown, to yieldingly maintain them in any desired position and a handle 45 may be attached to the yoke 42 to facilitate the manual adjustment. It will be readily apparent that by merely shifting the magnet 15 about the screw 40 its poles will be altered with respect to its armature 20, as shown in broken lines in Figure 2, and its effective magnetic attraction of the said armature thereby controlled.

In some cases it may be desirable to amplify the sounds produced by the magnet 5 and I have shown in Figure 1 one form of a device suitable for augmenting these said sounds. This consists of a support 50 secured to the plate 4 provided with an enlarged portion 51 having a recess 52 in which is mounted a suitable diaphragm 53 carrying a U-shaped member 54 and having associated with it a suitable horn 55. The lever 11 in this case is provided with an upright extension 56 carrying at its upper end a pin 57 adapted to contact alternately with the legs 58 and 59 of the said U-shaped member 54. Any suitable form of amplifying device, however, may be employed.

The operation of the device as thus far disclosed may be briefly summarized as follows:

With the parts arranged substantially as shown in Figure 1, in order to obtain the proper action of the device, it is first necessary that the lever spring 28 be so adjusted as to move the armature 10 the maximum distance from its pole pieces 8 and 9, when the coils 6 and 7 are de-energized. This may be readily accomplished by manipulating the adjusting screw 29, which controls the lever 25 and through it the compression of the said spring 28. When the desired compression has been secured, the armature 20 is then adjusted with respect to its pole pieces 18 and 19, preferably so that its maximum air gap will be somewhat less than the maximum air gap between the armature 10 and its pole pieces.

The magnetic attraction of the magnet 15 is now adjusted, as by oscillating it about its pivot 40 in the manner above disclosed, until the force of its attraction when added to the compression of the spring 28, may be just overcome by the action of the magnet 5 upon its armature 10 in response to electric currents of the strength usually employed on main line circuits of this character. Under normal circuit conditions the instrument will now operate in the same manner as the usual main line telegraph sounder.

It frequently happens, however, that the strength of the current over the main lines varies, due to "leakage" or other extraneous currents passing thereover when the telegraphic impulses are being sent or interrupted, and such variation has heretofore been the cause of much trouble and delay, and many errors in transmission. With an instrument constructed in accordance with the present invention, however, such variations will be automatically compensated for, since they will affect the strength of both of the magnets 5 and 15 in the same ratio.

That is to say if the current strength increases, for example, due to extraneous or "leakage" currents or when the instrument is in use upon a maximum distance circuit and its use changed to some fractional part of such circuit, or when the resistance of a circuit is changed from its maximum resistance to some fractional part thereof, or, when the main line current strength is increased from any cause, such increase will simultaneously strengthen both of the magnets 5 and 15, which, acting in opposition to one another through their respective armatures 10 and 20, levers 11, 21, and 25, and the spring 28, will produce a uniform magnetic action of the instrument, the increased magnetic action of the magnet 15 compensating the increased magnetic action of the magnet 5, whereby sharp, clear, distinct sounds or "clicks" are produced by the armature 10 and "hanging" or "clinging" of the armature 10 to its magnet 5 prevented.

In other words, the magnet 15 acts as an automatic regulator or compensator for the magnet 5, always maintaining the action of the latter substantially uniform, regardless of the varying electrical conditions of the circuit.

On the other hand, should the main line current strength be diminished from any cause, such diminution will simultaneously affect the strength of both of the magnets 5 and 15, and their action will remain relatively as before, the sounds or "clicks", however, being generally reduced in loudness, but should the main line current strength be diminished to such a degree that the sounds or "clicks" are too low, to be read reliably, the main line current strength must be increased in any manner well known when using the present telegraph receiving apparatus.

The magnet 15 is preferably, though not necessarily, constructed so as to be slightly "sluggish" in its action, to the end that force exerted thereby in addition to that of the spring 28, in opposition to the action of the magnet 5 may be slightly prolonged after the breaking of the circuit thereby se-

curing a quick "break" of the armature 10 and eliminating the "sticking" or "clinging" of the said armature.

For some forms of work, the usual type of anvil may be employed in connection with this instrument, in which case the base 1 and the lever 11 need only be extended a short distance to the right and the anvil secured to the said base in operative relation to the said lever in the well known manner.

It will be evident to those skilled in the art that in lieu of the magnet 15, the lever 25, by the action of the magnet 5, and the lever 11, can be utilized to increase the tension of the spring 28, proportionately to the magnetic strength of the magnet 5 and the leverage obtained with the lever 25.

Instead of the mechanical adjustment of magnet 15 for the purpose of controlling the effective magnetic pole upon its armature, any suitable means may be employed such, for example, as a variable resistance 60, connected in series with the coils of said magnet 15 as diagrammatically illustrated in Figure 5. In such case, of course, the magnet need not be pivotally mounted upon the base plate 2, but may be rigidly secured thereto in the same manner as the magnet 5.

It is obvious that those skilled in the art may vary the details of construction as well as the arrangement of parts without departing from the spirit of the invention, and therefore it is not desired to be limited to the above disclosure except as may be required by the claims.

What I claim is:

1. In a telegraphic receiving instrument, the combination of an electro-magnet; an armature for said magnet; a second electro-magnet; a second armature for said last named magnet; separate pivots for said armatures; a vertical pivot around which said second magnet may revolve to adjust its attraction for said second armature; a spring to hold said second magnet in its new position after having been moved around said vertical pivot; a lever mounted on the pivot of said second armature; an adjusting screw for one end of said lever; and a spring located between said first named armature and the other end of said lever, substantially as described.

2. In a telegraphic receiving instrument, the combination of a sound producing electromagnet; an armature associated with said magnet and adapted to be attracted thereby; a pivot for said armature; an auxiliary electromagnet associated with said sound producing magnet; an armature associated with said auxiliary magnet; an additional pivot for said last named armature; a lever associated with said last named pivot; spring connections between said lever and said first armature; and means associated with said lever adapted to adjust the compression of said spring, substantially as described.

3. In a telegraph receiving instrument the combination of a sound producing electro-magnet adapted to be connected with a main line circuit; an armature associated therewith; a second electro-magnet associated with said first magnet, and in circuit therewith; an armature associated with said second magnet; means actuated by said second magnet opposing the attractive movement of the armature of the first magnet, and means adapted to determine the effective magnetic action of said second magnet without increasing the air-gap between the core ends of said second magnet and its armature, substantially as described.

4. In a telegraphic receiving instrument, the combination of a base; a sound producing electromagnet secured to said base; an armature pivotally associated with said magnet; a compensating magnet pivotally mounted upon said base; a second armature pivotally associated with said compensating magnet; a lever rigid with the pivot of said second armature and provided with an arm extending beneath said first armature; spring connections between said arm and said first armature; adjusting means associated with said lever; and means whereby said compensating magnet may be moved about its pivot relative to its armature, substantially as described.

5. In a telegraph receiving instrument adapted for use in a main line circuit, the combination of an electromagnet; an armature associated with said magnet and adapted to be attracted thereby; a second electro-magnet responsive to the main line current and adapted to exert a force in opposition to the attractive movement of the armature of said first magnet; means associated with said second magnet to determine its effective magnetic action, and diaphragmic means associated with the armature of said first magnet and coacting therewith for augmenting the sounds that may be produced by the action of said first magnet, substantially as described.

In testimony whereof I affix my signature.

CHARLES ADAMS-RANDALL.