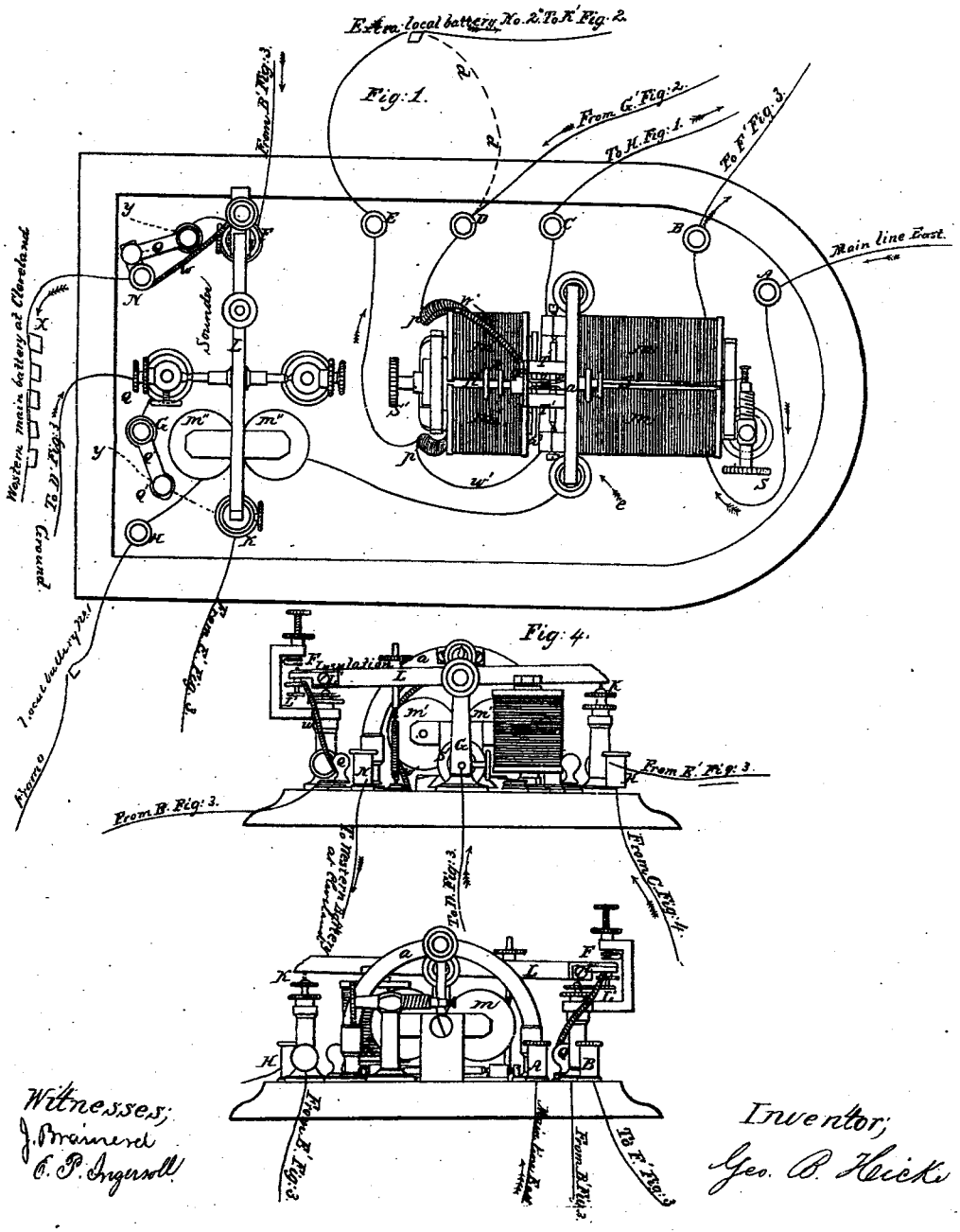
G. B. Hicks

Sheet 1, 3 Sheets.

Telegraph Repeater.

No. 34,574. Patented Mar. 4, 1862.



Witnesses;
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Inventor;
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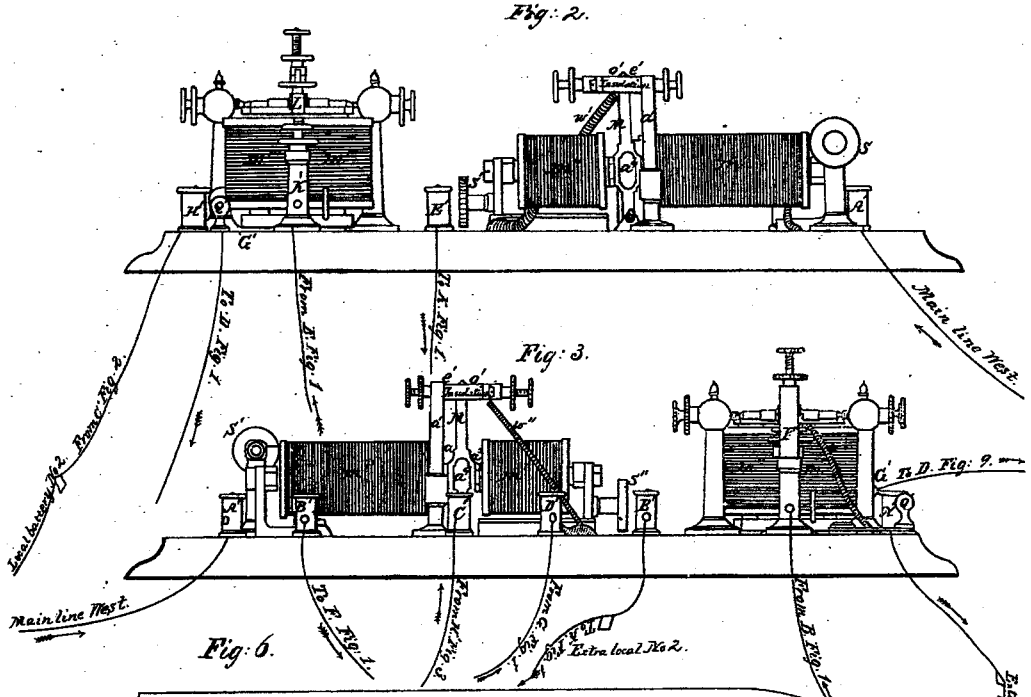
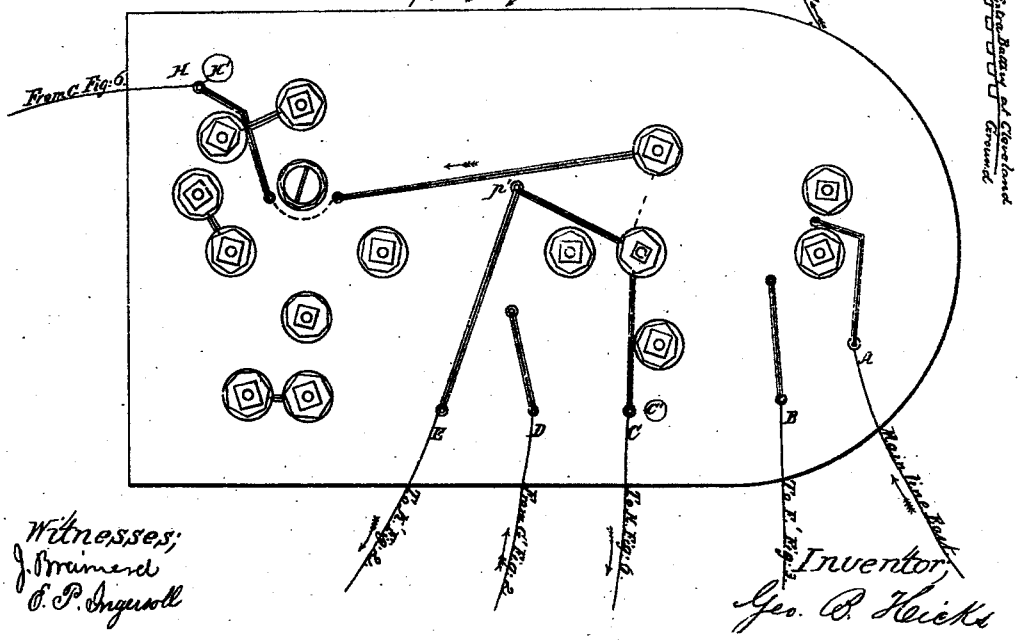
Sheet 2
3 Sheets.

Telegraph Repeater.

No. 34,574. Patented Mar. 4, 1862.

Fig: 2.





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3 Sheets—Sheet 3.

Telegraphic Repeater.

No. 34,574.

Patented March 4, 1862.

Fig: 7.

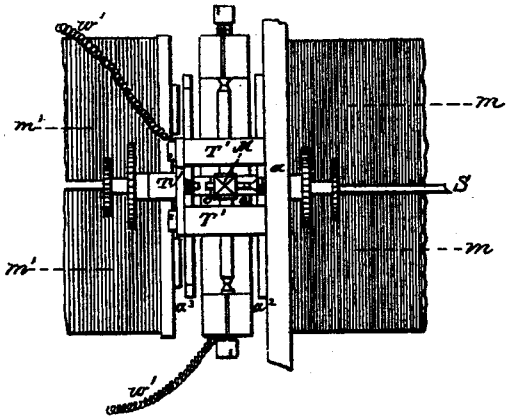


Fig: 8.

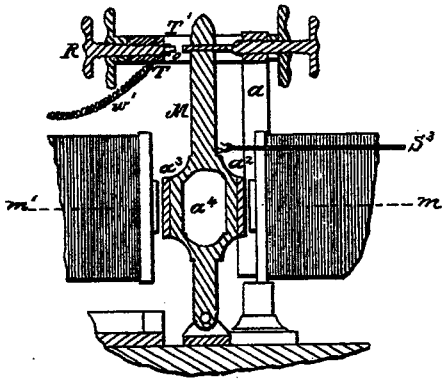
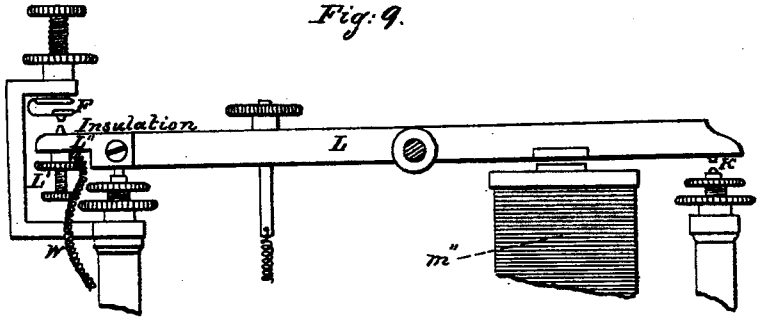


Fig: 9.



Witnesses:
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UNITED STATES PATENT OFFICE.

GEORGE B. HICKS, OF CLEVELAND, OHIO.

IMPROVEMENT IN TELEGRAPHIC APPARATUS.

Specification forming part of Letters Patent No. **34,574**, dated March 4, 1862.

To all whom it may concern:

Be it known that I, GEORGE B. HICKS, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented new and useful Improvements in Telegraph Apparatus; and I do hereby declare that the following is a full and complete description of the construction and operation of the same, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a top view. Figs. 2 and 3 are side views. Figs. 4 and 5 are end views; and Fig. 6 is a view of the under side, showing the connections. Figs. 7, 8, and 9 are enlarged views.

Like letters refer to like parts generally, but the letters in Figs. 1 and 2 have one more accent than in the other figures, for the purpose of clearness in describing the connections between two similar instruments, duplicates being used in their operation at remote stations.

The armature of the receiving-magnet in this instrument, (see *m m*, Figs. 1, 7, and 8,) instead of being adjusted by a spring, pulling the armature a^2 from the magnet *m m*, as in the instruments now in common use, has a movable local magnet, *m′ m′*, Figs. 1, 7, and 8, placed behind its armature, (the armature being double, as seen at a^2 a^3 in Figs. 7 and 8,) this local magnet *m′ m′*, Figs. 1, 2, 7, and 8, being adjusted close to or as near to the armature as required by means of the screw S′, Fig. 1, and S″, Figs. 2 and 3. The armature being double, as above, (see a^2 and a^3,) allows a space, a^4, Figs. 2, 3, 7, and 8, between the magnets *m m* and *m′ m′* such that the magnetism of one magnet cannot influence the other.

A wire from a local battery (extra local battery No. 1, see drawings) is brought to the post E, thence underneath the base to the magnet *m′ m′*, thence underneath the base again to the post D, whence circuit is represented as completed to the battery by the dotted line *d d* in Fig. 1.

Wires *w′ w′* are attached to the local-magnet wires *p p′*. One of these is connected to the screw R′, Figs. 1, 7, and 8, by means of the brass plate T, attached to the insulating-bars T′ T′, Figs. 1, 7, and 8, which plate T is thus insulated from the arc *a*, Figs. 1, 7, and 8. The other wire, *w′*, is connected from *p′* to the armature-lever M, Figs. 2, 3, 7, and 8, underneath the base, so that when this lever M rests on the point *o*, Figs. 1, 7, and 8, the current from the local battery No. 1 traverses the short circuit offered by the wires *w′ w′*, instead of passing through the coils *m′ m′*, Figs. 1, 7, and 8.

A weak spring of elastic gum or coiled wire (seen at S^3 in Figs. 1, 7, and 8, from which a thread winds upon the tightener S in Fig. 1, and S′ in Fig. 2) is attached to the armature-lever M, and is so adjusted by turning the tightener S, Fig. 1, or S′, Fig. 2, that it has a very slight tension. Suppose, now, a main line to be connected to the magnet *m m*, the magnet *m′ m′* being so adjusted that the armature-lever will rest on the point *e′*, Figs. 1, 7, and 8, when the main line is closed. Now let the main line be opened, the magnet *m′ m′* will pull back the armature-lever M from the point *e* into contact with the point *o*, but the instant there is contact at *o* the current from the extra local battery No. 1 ceases to pass through the coil of *m′ m′*, and takes the short route furnished by the wires *w′ w′*, and the magnet *m′ m′* instantly ceases to act. The spring S^3 will consequently pull the armature-lever M away from *o*; but the instant contact at *o* ceases the current of the local battery passes through the coil of the magnet *m′ m′*, and the armature-lever M is again pulled back to *o* by the magnet thus brought into action, whence it is again drawn, as before, and so on as long as the main circuit continues to be opened and closed—that is, when the main circuit is closed the current of the main line passes through the coil of *m m*, while that from the local battery passes through the wires of *w′ w′*; but when the main line is broken the current from the local battery passes alternately through the coils of *m′ m′* and the wires *w′ w′*, the result being that so long as the main current remains broken the armature-lever M will vibrate upon the point *o* with great rapidity without contact with the point *e*, and through so small a space as to be imperceptible to the eye. By means of this action the tendency of the armature-lever M to pass from *o* to *e* is so strong when the current from the local battery is caused to take the short route *w′ w′*

that a very slight current through *m m* suffices to make it do so.

The sounder (shown in Fig. 1) is made in the usual way, (see also Fig. 9, which is an enlarged view of the upper part,) and consists of a pair of coils, *m'' m''*, and an armature-lever, L, with the addition of a screw, L', which is insulated from the lever L by means of the insulating-bar L'', as shown in Figs. 4, 5, and 9, and which strikes the point on the spring F, Figs. 4, 5, and 9. Connection is made from the local battery No. 1 to the post H, thence through the magnet *m'' m''*, and *via* the arc *a*, the point *e*, and the armature-lever to the post C', whence connection is completed back to the battery.

It will be observed that in Fig. 4 the line running to the post H is marked "from C, Fig. 4," (see C, Fig. 6,) although no post is visible in the figure. This is so marked because this connection cannot properly be represented on two different figures. The same remark applies to the lines drawn to the posts H', C', and H in Figs. 2, 3, and 5, respectively, seen also in Fig. 6.

Q and Q' represent buttons, which serve to make direct connection, when desired, between the posts F and N and K and H.

For repeaters, two instruments like the one just described are used; Fig. 1 may represent one, and Figs. 2 and 3 give different views of the other.

For clearness of description as to their operation, suppose the instruments are placed at Cleveland, Ohio, the connections are as follows: The main line east connects to the post A, thence passes through the magnet *m m* and *via* the post B to F', Fig. 3, whence circuit is completed through connection furnished by the screw and spring shown in Figs. 4 and 5, to post N', thence to the appropriate battery and ground. Similarly the main line west comes to the post A', (shown in Figs. 2 and 3,) passes through the magnet *m' m'*, thence *via* the post B', shown in Fig. 3 only, to F, Fig. 1, whence circuit is completed by contact on the spring at F, Fig. 1, the wire, *w* and the post N, to the appropriate battery and ground X, Fig. 1. A wire from extra local battery No. 1 goes to K', (shown only in Fig. 2,) thence connection is made *via* the lever L', Fig. 2, and the post G', Fig. 2, to the post D, Figs. 1 and 6, whence circuit is completed through the magnet *m' m'* *via* the post E, Fig. 1, to the extra local battery No. 1, Fig. 1. Similarly, a wire from E', (shown in both Figs. 2 and 3,) is connected with extra local battery No. 2, Fig. 3, whence a wire is carried to K, Fig. 1; from K, Fig. 1, circuit is completed *via* lever L and the post G, Fig. 1, back to the battery No. 2, Fig. 3. It is evident that, these connections once made, if the sounder armature-lever L of Fig. 1 be in the position represented in Figs. 4 and 5, there can be no circuit or current through either of the magnets *m' m' m'' m''*, Figs. 2 and 3, for the circuit through *m' m'* is broken at F, Figs. 4 and 5, and the circuit through *m'' m''* is broken at K, same figures. Similarly the sounder armature-lever in Figs. 2 and 3 may break circuit simultaneously through the magnets *m m m' m'*, Fig. 1.

It will have been observed that reference to Figs. 2 and 3 is made as to one instrument, since one figure represents one side and the other figure the other side of the same instrument.

Operation as a repeater: Suppose the instrument connected as described, and the buttons Q and Q' opened, as indicated by the dotted lines *y y*, Fig. 1, so that there may be no direct connection between the posts F and N and the posts G and K, Fig. 1, and F' and N' and G' and K', Figs. 2 and 3. Let an operator on the western line break the circuit, the local magnet *m'' m''*, Figs. 2 and 3, will pull the armature-lever from the point *e'*, and thus break the local circuit through *m''' m'''*, Figs. 2 and 3. The lever L' will be elevated from K' and depressed at F'. (K' is shown in Fig. 2, and F' in Fig. 3.) The main current through *m m*, Fig. 1, will therefore be broken at F' and the local circuit through *m' m'*, Fig. 1, at K'. The armature-lever hence cannot move, for there is no circuit on either side of it, and it is kept from jaring out of place by the slight tension given to the spring attached to S, Fig. 1, and connection being thus maintained at *e*, Fig. 1, the lever L of the sounder cannot move, and the main circuit through *m' m'*, Figs. 2 and 3, is held closed at F, and the local circuit through *m'' m''*, Figs. 2 and 3, is held closed at K, Fig. 1. Now let the western circuit be closed, circuit through *m' m'*, Fig. 1, will be closed at K', and through *m m*, Fig. 1, at F', and since the adjustment of the magnet is necessarily such that the action of *m m* is stronger on the armature than is the action of *m' m'*, Fig. 1, the armature still will not move. Hence, finally, if the western operator continues to write, the writing will be repeated on the eastern line, but the instrument on the eastern line is held quiet by the simultaneous breaking and closing of the circuits through the magnets *m m* and *m' m'*, Fig. 1. Now, let the eastern operator wish to interrupt the western, he will break the eastern circuit. Then the next instant that the western circuit is closed there is circuit through the magnet *m' m'*, Fig. 1, for it is closed at K', Fig. 2; but there is no circuit through the magnet *m m*, Fig. 1, because it is broken east. The armature-lever therefore of the receiving-magnet, Fig. 1, will be drawn back upon *o*, Fig. 1, by the local magnet *m' m'*, and the breaking contact at *e*, Fig. 1, will break the circuit through magnet *m'' m''*, Fig. 1, the lever L will be raised at K and depressed at F, and consequently the circuit through magnet *m' m'* and *m'' m''*, Figs. 2 and 3, will be broken, the former at F and the latter at K, and therefore the armature of the receiving-magnet on the western line will be held still, the circuit through *m m*, Fig. 1, will

be held closed at F′, Fig. 3, and the circuit through m' m', Fig. 1, will be held closed at K′, Fig. 2, and the east can now write west.

What I claim as my improvement, and desire to secure by Letters Patent, is—

1. The employment of an adjustable magnet, m' m', as and for the purpose herein set forth.

2. The double armature-lever M, with the attached armatures a^2 a^3, arranged and operating as specified.

3. The employment of the local battery No. 1, in combination with the helix m' m', the conducting-wires w' w', and the points o and e, arranged and operating as and for the purpose described.

4. The employment of two points, one on each end of the sounder armature-lever L, by means of which circuit through two magnets on opposite sides of the same armature may be closed or broken simultaneously, and thus the armature-lever held still for the purpose described.

5. The combination of the adjustable local magnet m' m' with the receiving and recording instruments, when arranged and operated as and for the purposes specified.

GEO. B. HICKS.

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