(No Model.)

W. W. ALEXANDER & M. C. GILLHAM.

MECHANICAL TELEGRAPH SOUNDER.

No. 572,945. Patented Dec. 15, 1896.

Fig. 1.

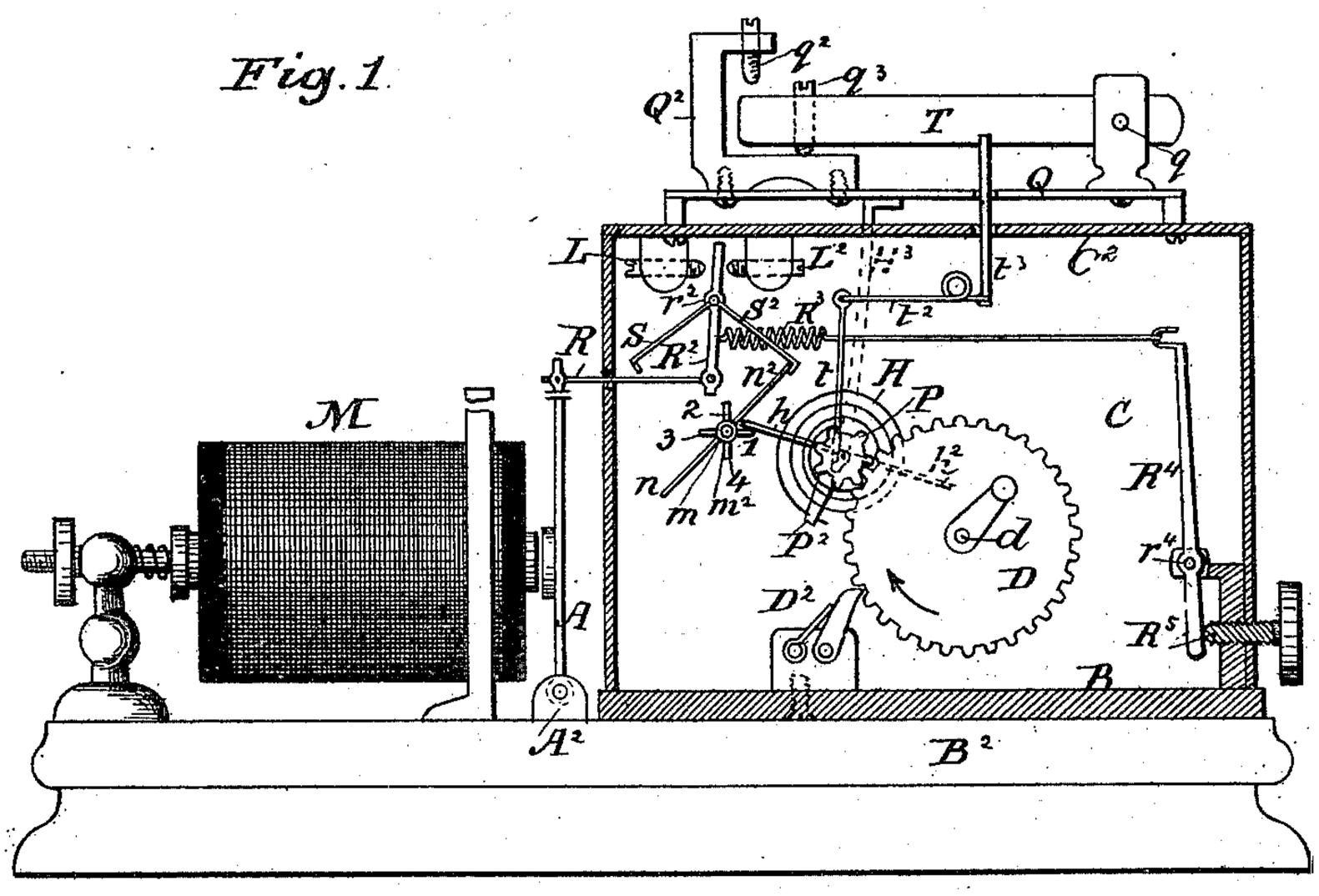


Fig. 2.

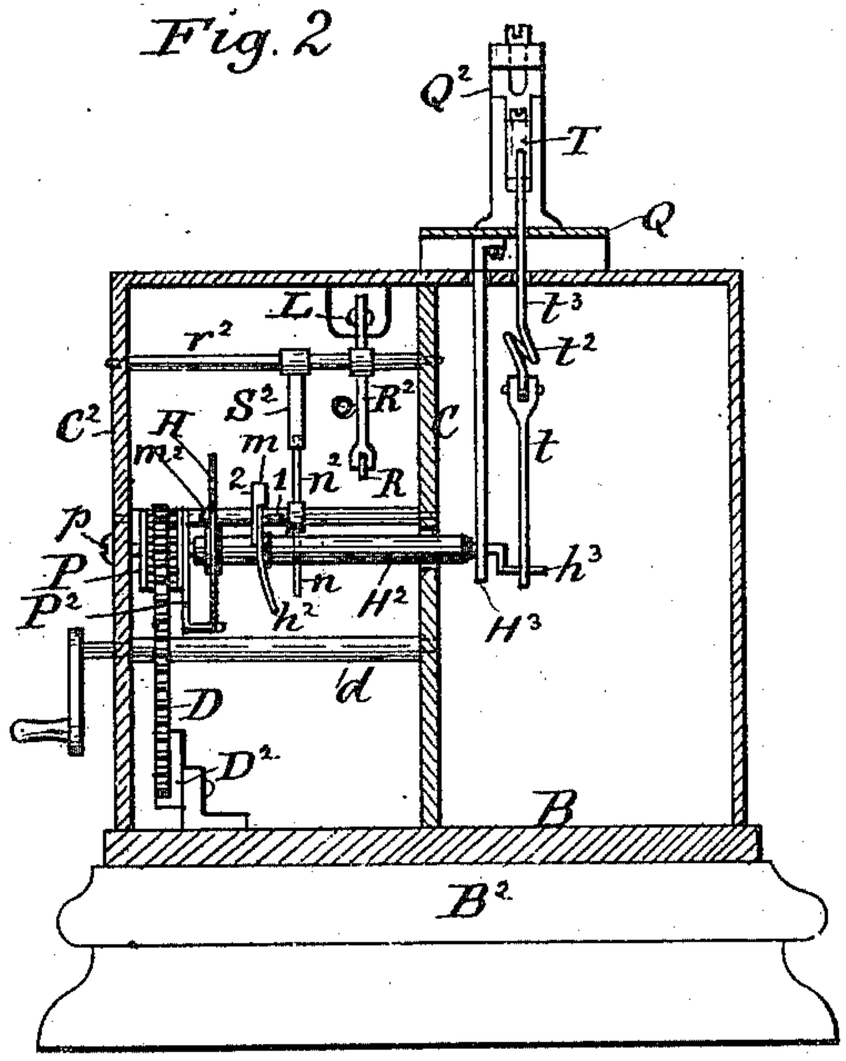
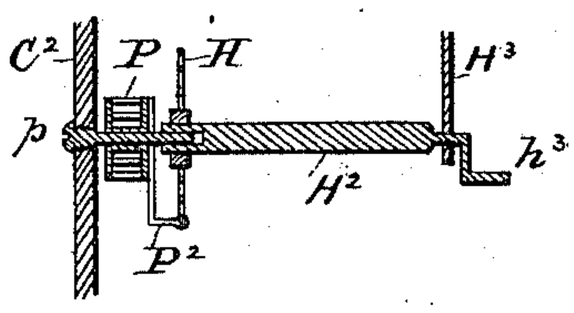


Fig. 2ª



WITNESSES

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MECHANICAL TELEGRAPH-SOUNDER.

SPECIFICATION forming part of Letters Patent No. 572,945, dated December 15, 1896.

Application filed April 23, 1894. Renewed May 18, 1896. Serial No. 592,072. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM W. ALEXANDER, residing at Kansas City, in the county of Jackson, State of Missouri, and MANCEILLIA C. GILLHAM, residing at Kansas City, in the county of Wyandotte, State of Kansas, citizens of the United States, have invented certain new and useful Improvements in Mechanical Telegraph-Sounders, of which the following is a specification, reference being had therein to the accompanying drawings.

Our invention relates to a mechanical apparatus whereby signals transmitted by the electric telegraph may be accurately received and sounded without any local battery. As is well known, signals transmitted by the electric telegraph are received by means of an electric sounding device operated by the electrical energy supplied by a local battery. The efficiency of the electric sounding device is generally dependent upon the energy supplied by the local battery and the perfect condition of the electrical contact-points, as well as perfect adjustment of the telegraph-relay. If the line-current becomes impaired by partial ground, leaks, or low condition of line-battery, or the line adjustments are bad or the contacts are oxidized, the signals transmitted, if received, are sounded imperfectly, and therefore not understood. The local battery is troublesome, unreliable, and expensive, and the sounder being constantly affected by the variableness of the energy of both line and local batteries and having more or less magnetic lag frequently fails to sound the transmitted signals accurately.

It is the purpose of our invention to provide a simple mechanical apparatus of peculiar construction having a uniform source of mechanical energy for operating a telegraph signaling instrument according to and in unison with the electric signals transmitted by means of accurately-responding mechanism so organized that every vibration of the armature of the relay-magnet will be accurately sounded and with uniform energy and distinctness. These purposes we accomplish by the means illustrated in the accompanying drawings and hereinafter fully described, the same being definitely pointed out in the claims following the specification.

In said drawings, Figure 1 is a side elevation of a telegraph-sounder constructed in accordance with our invention, one of the sides of the inclosing frame being removed and the other sides shown in section. Fig. 2 is a transverse vertical section of the same. Fig. 2^a is a longitudinal section of the hair-spring shaft and its supports.

In said drawings the supporting-base for the mechanism is shown at B and rests upon and is secured to a base-board B^2, upon which are also mounted the relay-magnet M and the pivot-bearing A^2 of the armature A. The upper end of said armature is united by means of a connecting-rod R with the lower end of a substantially vertical lever R^2, that is pivotally mounted upon a horizontal shaft r^2, having its ends journaled in vertical plates C, one of which may form one of the sides of the frame C^2 that incloses the mechanism. The lever R^2 is allowed to oscillate with its pivot-shaft r^2, but to regulate the angle of its oscillation its upper end is located between two adjustable stops L and L^2, that are in the form of screws having their points toward said lever, said screws being received in lugs pendent from the top of the frame C^2, but said lugs may project from other parts of the frame.

The pivot-shaft r^2 of the lever R^2 is provided with arms S and S^2, rigidly attached thereto radially, but divergent from each other, as escapement-pallets, and the outer ends of said arms are bent in the form of hooks to adapt them to act as detents. To the side of the lever R^2 opposite that occupied by the rod R is attached one end of a retractile spring R^3, that has its opposite end connected to the upper end of a pivotally-mounted lever R^4. Said lever is pivoted at r^4 to a bearing projecting inwardly from the frame C^2 and has its lower end bearing against the point of an adjusting-screw R^5.

D represents a gear-wheel rigidly secured upon a shaft *d*, to which is attached a crank-handle d^2, by which it may be revolved in the direction shown by the arrow on the wheel D, a spring-pawl D^2 being shown in engagement with the teeth of said wheel; but it must be understood that said wheel D can be rotated by any well-known means, such

as a power-train, or by belts or sprocket-chains passing around pulleys mounted upon its shaft and suitable devices rotated by compressed air, steam, or other power.

The gear-wheel D meshes with a pinion P, loosely mounted upon a stud p, secured to the frame C^2. Said pinion has rigidly fastened to its inner face an arm P^2, the free end of which is bent parallel with the stud p and has adjustably secured thereto the outer end of a hair-spring H. The inner end of said spring is secured to a collar rigidly attached to a shaft H^2, and said shaft has one end tubular and mounted upon the end of the stud p, while the opposite end of the shaft is supported by a hanger H^3, secured to the under side of the sounder Q.

Rigidly fastened to the shaft H^2 are two detaining-arms h and h^2, arranged diametrically, but the outer end of the arm h^2 is bent slightly to one side, so as to engage alternately with the two pallets 2 and 4 of a stop-pinion M, the arm h being adapted to engage with the other two pallets 1 and 3 of said stop-pinion. Said pallets 1 and 3 are in a plane in the path of the arm h, while the pallets 2 and 4 are in the path of the bent end of the arm h^2, and consequently in a plane alongside of the plane of the pallets 1 and 3. The stop-pinion m is mounted upon and attached to a shaft m^2, and upon said shaft are also diametrically mounted two arms n and n^2, which are in the same plane with the oscillating arms S and S^2 of the shaft r^2 and alternately come in engagement with said oscillating arms. Upon the inner end of the shaft H^2 is attached a crank h^3, having pivoted thereto a connecting-rod t in a substantially vertical position. To the upper end of said rod t is pivotally attached one end of a spring t^2, having its opposite end rigidly secured to the lower end of a rod t^3, and the latter rod has its upper end rigidly attached to the sounder-lever T. Said lever has one end pivoted at q to a standard mounted upon the sounder Q, while its opposite end is adapted to vibrate vertically between the arms of an angular frame Q^2, secured upon the sounder. The upper arm of said frame carries an adjustable stop q^2 above the free end of the sounder-lever T, and said lever also carries an adjustable stop q^3, adapted to rest upon the lower arm of the frame Q^2.

The object of the spring t^2 on the lower end of the rod t^3 below the sounder-lever is to cushion the blow imparted to said sounder-lever and to permit the movement of said lever without releasing the energy of the hair-spring H, and thus prevent shocks to the mechanism.

The operation of the apparatus is as follows, viz: In Fig. 1 the relay-armature is shown as attracted by the magnet M against the tension of the retractile spring R^3. Now if the magnet M is discharged the spring R^3 will pull the pivotally-mounted rod R^2 until its upper end rests against the limiting-stop L, thus allowing the arm S^2 and the arm n^2 to be disengaged by the propelling energy of the spring H and the arm n to move in engagement with the arm S. The stop-pinion m making a one-quarter revolution, the arm h moves from engagement with the pallet 1 of the stop-pinion m and the arm h^2 moves into engagement with the pallet 2 of said stop-pinion m, thereby allowing the shaft H^2 and the crank h^3 to make a one-half revolution, pressing the sounder-lever T against the upper stop q^2 of the sounder Q by means of the uplifting of the connecting-rod t, spring t^2, and rod t^3. This operation completes the mechanical movement of the parts impelled by the energy of the spring H upon the discharge of the magnet M. Now if the magnet M again attracts the armature A against the tension of the retractile spring R^3 the armature A, by means of the rod R, pulls the pivotally-mounted rod R^2 until the upper end thereof rests against the limiting-stop L^2, as shown in Fig. 1, thereby allowing the arm n to leave the arm S and to engage with arm S^2, completing a one-quarter revolution of the stop-pinion m, the arm h^2 moving from engagement with the pallet 2 of the stop-pinion m and causing the arm h to engage with the pallet 3 of said stop-pinion m, thus permitting the energy of the spring H to revolve the shaft H^2 and the crank h^3 a one-half revolution with a downward pull on the connecting-rod t, spring t^2, and rod t^3, forcing the sounder-lever T down upon its bottom stop q^3, the latter resting on the frame Q^2 of the sounder Q, completing the mechanical movement of the parts when the magnet M is attracting the armature A. When the magnet M again discharges, the retractile spring R^3 pulls the pivotally-mounted rod R^2 and its connected parts until the upper end thereof rests against the limiting-stop L, allowing the arm S^2 and the arm n^2 to be disengaged by the propelling energy of the spring H and the arm n^2 to move to engagement with the arm S, the stop-pinion m making a one-quarter revolution. The arm n is disengaged from the pallet 3 of the said stop-pinion m and the arm n^2 moves to engagement with the pallet 4 of said stop-pinion m, thereby allowing the shaft H^2 and the crank h^3 to complete a one-half revolution, pressing the sounder-lever T against the stop q^2 of the sounder by means of the uplifting of the connecting-rod t, spring t^2, and rod t^3. This operation completes the mechanical movement of the parts impelled by the energy of the spring H upon the second discharge of the magnet M.

When the magnet M again attracts the armature A, said armature, by means of the rod R, pulls the pivotally-mounted rod R^2 against the tension of the retractile spring R^3 until the upper end of the rod R^2 rests against the limiting-stop L^2, allowing the arm n to leave the arm S and to engage with the arm S^2. The stop-pinion m, making a one-quarter revolution, releases the arm h^2 from engagement

with the pallet 4 of said stop-pinion m and allows the arm h to engage with the pallet 1 of said stop-pinion m, as shown in Fig. 1, and thereby allowing the energy of the spring H to revolve the shaft H^2 and crank h^3 a one-half revolution with a downward pull on the connecting-rod t, spring t^2, and rod t^3 and forcing the sounder-lever T down with the bottom stop q^3 upon the sounder. This operation completes the mechanical movement of the parts impelled by the energy of the spring H upon the magnet M attracting the armature A and completing the four phases of the one revolution of the stop-pinion m.

We do not restrict ourselves to four pallets on the stop-pinion m, as the mechanical principle involved will admit of any number of pallets being used.

Having now fully described our invention, we claim—

1. A mechanical telegraph signaling instrument consisting of an electromagnet, its armature, an oscillating lever R^2 connected therewith, a retractile spring R^3 attached to said lever, adjustable stops on opposite side of said lever, a pivot-shaft for said lever, hooked arms S and S^2 secured to said shaft and a pivoted arm n^2 to engage with said arms S and S^2, pallets and a crank upon the pivot-shaft m^2 of the arm n^2, a springy connecting-rod uniting said crank with a pivoted sounder-lever, pivoted arms h h^2 to engage alternately with the pallets on the shaft m^2, a coiled spring mounted upon the pivot-shaft of the arms h h^2 and having one end connected to a pinion P, with means to rotate said pinion substantially as described.

2. In a telegraph signaling instrument the combination of an electromagnet, its armature, an oscillating escapement connected therewith, rotary arms n n^2 engaging with said escapement-pallets upon their shaft, arms h h^2 for engagement with said pallets, a shaft carrying a coiled hair-spring and a crank, a springy connecting-rod uniting said crank to a sounding-lever, a pinion connected with the hair-spring and means to rotate said pinion substantially as described.

3. In a telegraph signaling instrument the combination of an electromagnet, its armature, an oscillating and a rotary escapement with a coiled hair-spring upon the shaft carrying the controlling-arms of the rotary escapement, a crank upon said shaft, a sounding-lever, a connecting-rod uniting said crank with the sounding-lever, a pinion connected with the hair-spring and means to rotate said pinion substantially as described.

4. In a telegraph signaling instrument the combination of an electromagnet, its armature, an escapement connected with said armature, a sounding-lever, a springy connecting-rod uniting said sounding-lever with a crank upon a shaft carrying a coiled hair-spring, a pinion connected with said hair-spring and means to rotate said pinion substantially as described.

In testimony whereof we affix our signatures in presence of two witnesses.

WILLIAM W. ALEXANDER.
MANCEILLIA C. GILLHAM.

Witnesses:
GARRETT ELLISON,
D. ELLISON.