

L. S. CRANDALL.

AUTOMATIC TELEGRAPH KEY AND REGISTER.

No. 171,998.

Patented Jan. 11, 1876.

fig: 1.

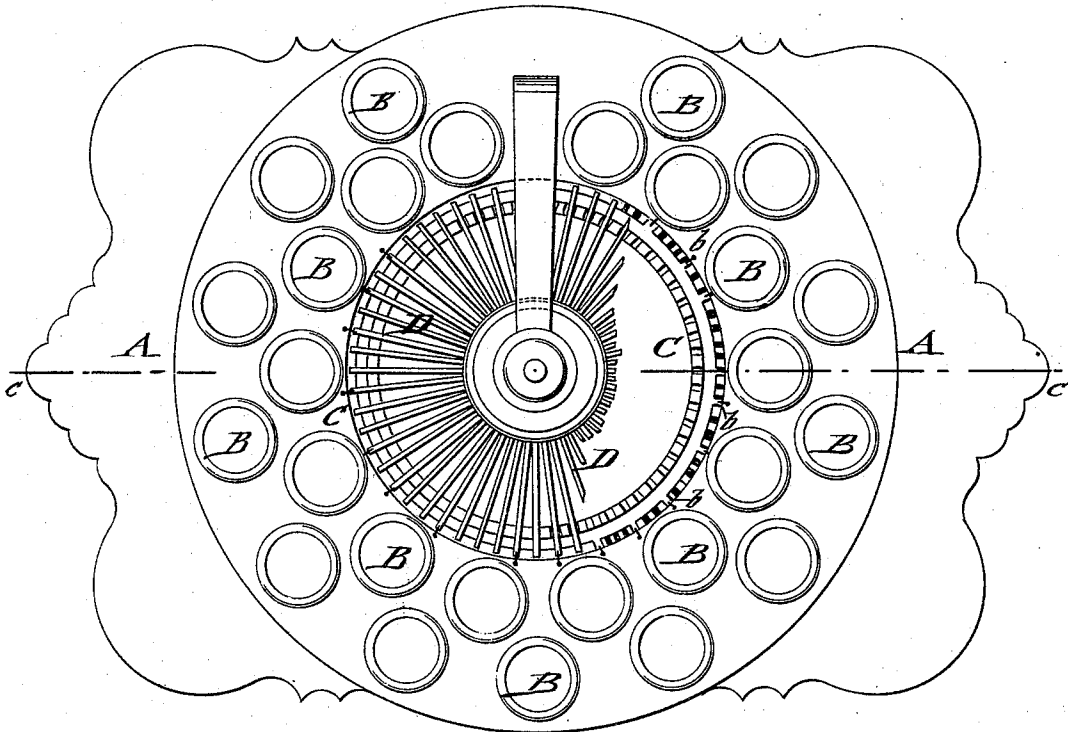
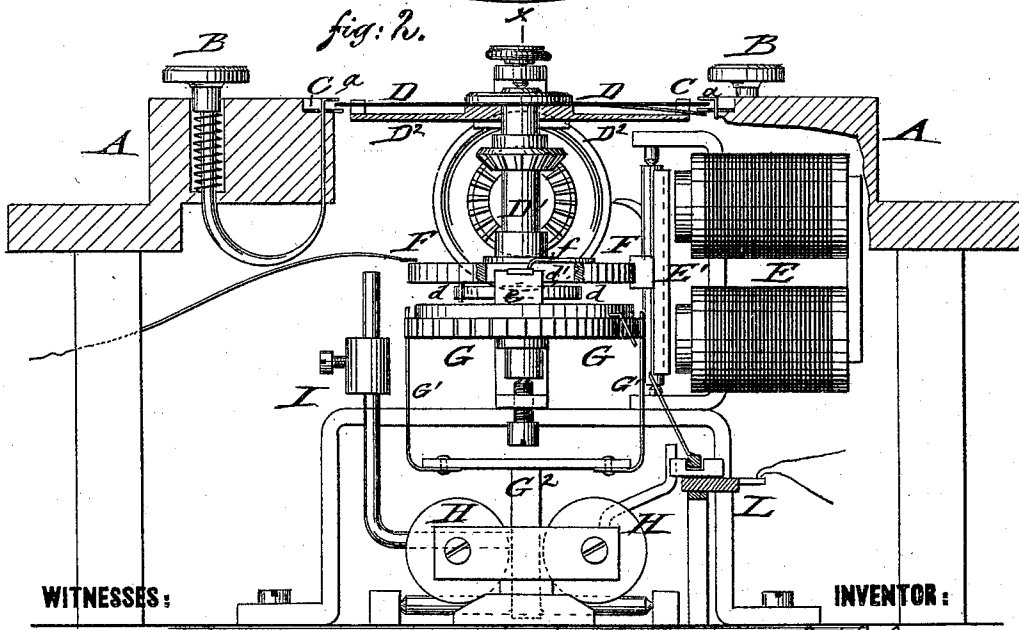


fig: 2.



WITNESSES:

INVENTOR:

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Alex. L. Roberts

BY

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mmmm
ATTORNEYS.

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fig: 3.

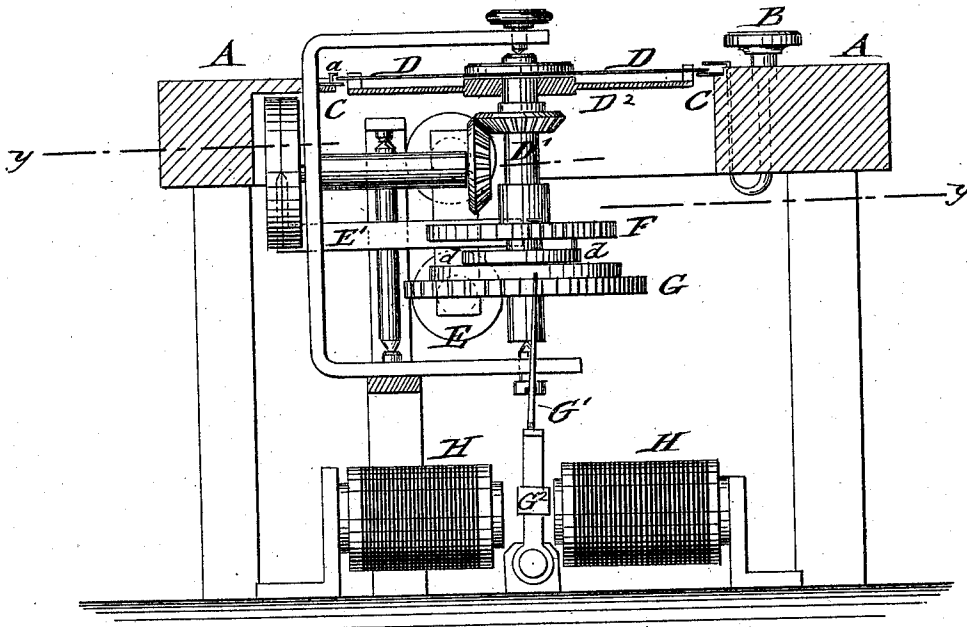
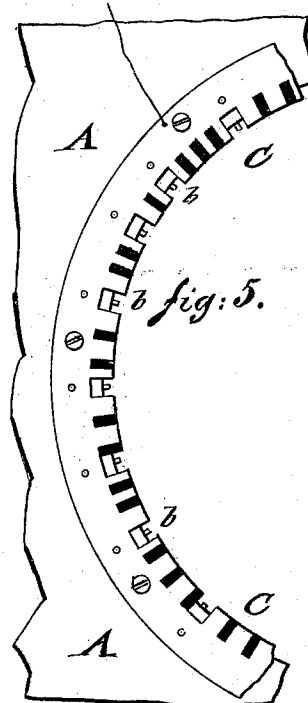
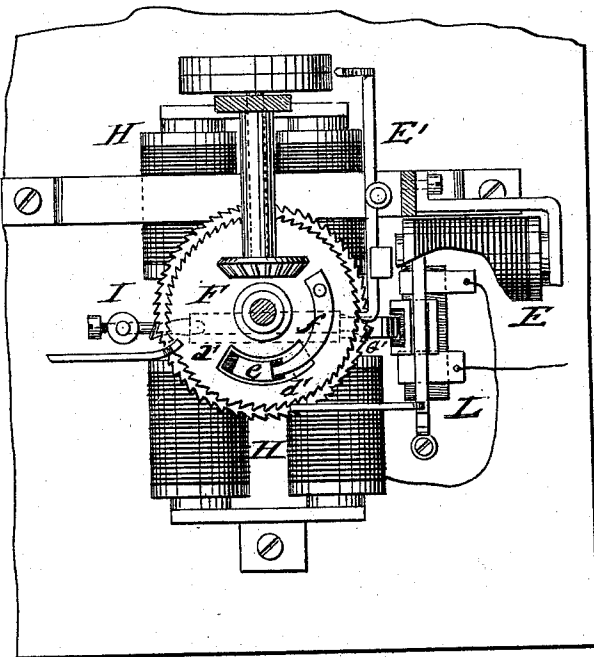


fig: 4.



WITNESSES:

Chas. Nida.
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UNITED STATES PATENT OFFICE.

LUCIEN S. CRANDALL, OF NEW YORK, N. Y.

IMPROVEMENT IN AUTOMATIC TELEGRAPH KEYS AND REGISTERS.

Specification forming part of Letters Patent No. **171,998**, dated January 11, 1876; application filed November 27, 1875.

To all whom it may concern:

Be it known that I, LUCIEN S. CRANDALL, of the city, county, and State of New York, have invented a new and Improved Automatic Telegraph Key and Register, of which the following is a specification:

In the accompanying drawing illustrating my invention, Figure 1 represents a top view; Fig. 2, a vertical longitudinal section on the line *c c*, Fig. 1; Fig. 3, a vertical transverse section on the line *x x*, Fig. 2; and Fig. 4, a horizontal section on the line *y y*, Fig. 3, of my improved automatic telegraph key and register combined; and Fig. 5 shows a bottom view of the letter-ring.

Similar letters of reference indicate corresponding parts.

The object of my invention is to construct an improved automatic telegraph-key and register, by which the manual and mental labor in transmitting telegraphic signals are facilitated and simplified to a considerable degree, the working capacity of telegraph-lines increased, and the accurate, reliable, and uniform manipulation of the instrument acquired by the operator with little instruction and practice.

The invention has, furthermore, the advantage of decreasing the number of instruments and the expense of the outfit of telegraph-offices, and substituting therefor a compact and reliable instrument.

The invention consists of a letter-ring, which is divided along its circumference by insulated and non-insulated portions and separating-recesses, to correspond to the characters of the Morse alphabet. A number of spring-keys are arranged around the letter-ring, and lettered alphabetically, to correspond with the Morse letters of the ring. A bridge or rider at the end of each key forms, when the key is depressed, the contact of the letter-ring with one of a series of needles or spring-tongues radiating from a vertical shaft that is intermittently actuated by the magnets by a local battery. The letter-ring and spring-needles form the poles of the main-line battery, and record the depressions of the keys by a relay-magnet with an armature, having lever with recording-stylus at one end, and stop-pawl at the other end. The stop-pawl

releases a spring-acted slip-wheel that throws a local actuating-battery in circuit, which interrupts, by two magnets with armature-pawls, switch, and governor, intermittent motion to a motor-wheel, connected by a partially-insulated and non-insulated stop with a recess and spring-rider, or contact of the slip-wheel, by which the motion of the motor-wheel and needle-arms may be kept up after main-line circuit is interrupted, to register spaces in and between letters. The number of needle-arms corresponds with the subdivisions on the letter-ring and the number of teeth on the motor and slip wheels, to expose at any moment one of the needles to the action of a key. This correspondence between divisions of letter-ring and number of needle-arms, and of teeth on motor-wheel, in connection with the intermittent motion of motor, gives a dwell at the points of magnetization and demagnetization of main-line circuit. The closing of the main circuit by the key throws the local circuit into operation, which revolves the needle-wheel until the local circuit is interrupted by the action of the hook-pawl on the slip-wheel, and the return of the needle through the recess of the letter-ring.

In the drawing, A represents the insulated key-plate of my improved automatic key and register, which is supported on suitable posts or standards, and arranged with the spring-keys B, that are placed around the letter-ring C. The keys are marked with the letters of the alphabet, to correspond to the Morse alphabet, arranged in insulated and non-insulated portions on the letter-ring C, which encircles a series of radial needle arms or tongues, D, that are keyed to a vertical revolving shaft, D¹, and securely retained and guided in a grooved supporting-disk, D². The spring-keys B may be made of any form, and guided in any suitable manner, each being provided with an end heel or bridge, *a*, that bears, on depressing the key, on the needle, carrying the same downward, and establishing contact between the letter-ring and needle, which form the poles of the main-line battery. The letter-ring C is divided into insulated and non-insulated portions, that correspond to the characters of the Morse alphabet, each section of the ring that forms one letter being

separated from the adjoining sections by slots or recesses *b b*, through which the particular needle *D* that chances to get depressed is forced out of its plane and carried below the letter-ring, so as to move or ride over the section of the letter-ring next following the recess, until allowed to return or spring back to its normal plane through the recess at the end of the section. The depression of a key closes the main-line circuit, and attracts the armature of a main-line or relay magnet, *E*. The armature of the relay-magnet *E* is affixed to a fulcrumed lever, *E*¹, whose one end is provided with a registering-stylus, while the other end forms a hook or stop-pawl, that engages the teeth of a slip-wheel, *F*, that slides loosely on vertical shaft *D*¹. The attraction of armature of main-line relay *E* brings stylus on registering-drum, and records the dots and dashes thereon, according to the non-insulated portions of the letter-ring, while the hook-pawl releases, at the same time, the slip-wheel *F*, which is acted upon by a spiral spring, *d*, and carried forward against an insulated stop, *e*, of the motor-wheel *G*, arranged below the slip-wheel *F*. The stop *e* extends through a recess, *d'*, of the slip-wheel, and forms contact with a spring-rider, *f*, of the same. A central metallic part of stop *e*, of greater length than the insulated ends, passes through the stop to the motor-wheel *G*, the slip-wheel and spring-rider forming one pole, the motor-wheel and stop the other pole, of a local battery. The motor-wheel *G* is operated by pawls *G*¹, that engage the teeth of the same at diametrically-opposite points.

The pawls *G*¹ are attached to the vibrating armature *G*², of two magnets, *H*, in the local circuit, which are alternately thrown into circuit to produce intermittent motion of the armature by a switch, *L*, that is operated by an insulated governing-arm of the armature. The armature *G*² of magnets *H* of the local battery is further provided with an upward-extending arm, *I*, which carries a sliding weight, adjustable thereon by a set-screw, said weighted arm serving as governor to regulate the speed of the magnetic impulses of the armature, the same being slower when the weight is higher, and quicker when the weight is lower. By retarding the speed of the armature the messages may be taken by sound, but, for most purposes, the direct registering of the messages on the drum is to be preferred on account of the greater rapidity of transmission.

The function of the local battery consists, mainly, in revolving the motor-wheel shaft and needles as soon as the local circuit is established by the release of the armature-pawl of the main-line magnet, (but it may also be made to actuate a separate recording-stylus or sounder by interposing suitable mechanism and connections.) This admits the forward motion of the needle-wheel to a limited distance after the main circuit is broken, producing thereby the passing of the depressed

needle over the letter-ring. The traveling of the needle along the longer or shorter insulated or non-insulated portions of the letter-ring registers the Morse characters with separating spaces.

The corresponding of the number of needles with the divisions of the letter-ring and the number of teeth of the motor and slip wheels produces the uniform motion of the needles, which motion is continued after the main-line circuit is broken until the motor-wheel has accomplished the distance which it is permitted to travel independently of the slip-wheel that keeps by its spring-rider the local circuit closed. This independent action of local circuit also accomplishes the space between letters and words.

When the spring-rider of the slip-wheel forms contact with the insulated end of the stop of the motor-wheel the local circuit is broken. The interruption of the main circuit by the contact of the needle with an insulated portion of the letter-ring produces the required spacing between the dots and dashes. The simultaneous and continued working of the local battery carries the needle over the larger or shorter insulated or non-insulated portions, and secures thereby the repeated closing of the main circuit, independently of the key, until by the retraction of the needle through the recess at the end of the letter section the combined action of main and local battery is interrupted, and the motion of local motor thereafter ceases, as soon as it has accomplished the distance that it is suffered to move independently. The rapid and automatic sending and registering of any letter by the mere depression of a letter-key avoids mistakes, simplifies and expedites the work of the operators, and increases the transmitting capacity of telegraph-lines.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In an automatic telegraph key and register the combination of a fixed letter-ring, divided into insulated and non-insulated portions and thrown into the main circuit by spring-keys and radial needles, with a local or motor battery actuating the needles, and being thrown into circuit by the closing of main circuit and continued during and after the interruption of the latter, to transmit magnetic impulses, according to the divisions or signs of the letter-ring, and establish the spaces between the same, substantially in the manner and for the purpose set forth.

2. In an automatic telegraph key and register the combination of a fixed letter-ring, divided into insulated and non-insulated portions, with lettered spring-keys and a series of radial needle-arms or tongues, said letter-ring and needles being the poles of the main battery to establish main-line circuit, substantially in the manner and for the purpose set forth.

3. In an automatic telegraph key and reg-

ister a fixed letter-ring, provided with the characters of the Morse alphabet, formed of insulated and non-insulated portions, the characters of each letter being separated from the adjoining letters by recesses or slots, substantially as set forth.

4. The fulcrumed armature-lever of main line or relay magnet, provided with registering-stylus at one end and stop-pawl at the other end, in combination with a spring-acted slip-wheel for releasing slip-wheel and establishing, by closing of main line, circuit of local battery, substantially as specified.

5. In a telegraph key and register a fulcrumed armature-lever of main-line or relay magnet, having registering-stylus at one end and stop-pawl at the other, to serve the two-fold purpose of registering the messages transmitted and establishing or interrupting circuit of local or motor battery, substantially as described.

6. The combination of the spring-acted and recessed slip-wheel, having a spring-rider, with a partially insulated and non-insulated stop of the motor-wheel, revolved intermittently by the magnets of the local battery, to establish circuit of the same on release of stop-pawl of main-line armature, substantially as specified.

7. The combination of the stop-pawl of armature of main-line magnet with slip-wheel and rider, and the motor-wheel, having partially insulated and non-insulated stop, to retain slip-wheel and allow motion of motor and needle-wheels for a limited distance after main-line circuit is broken, whereby the necessary spaces in letters and between letters and words are obtained, substantially as set forth.

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Witnesses:

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