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Improvement in Magneto Electric Dial-Telegraphs.
No. 130,855.

Patented Aug. 27, 1872.

Fig 3

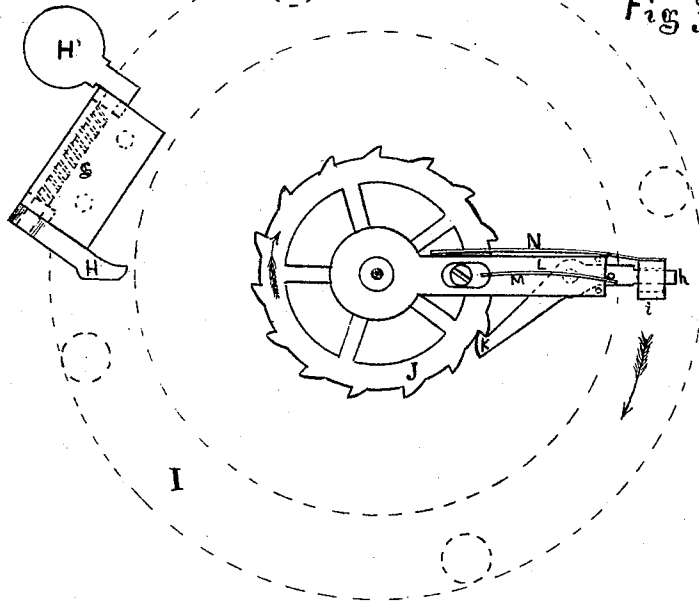


Fig 4

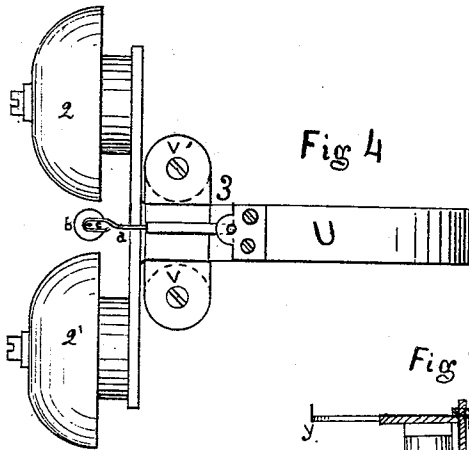


Fig 5,

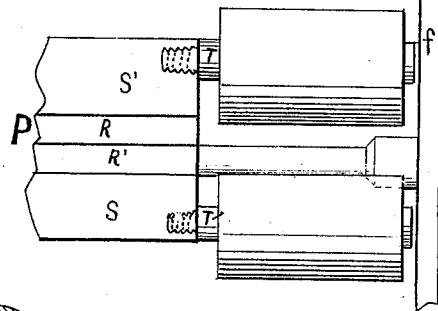


Fig 7,

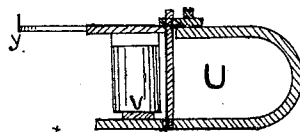
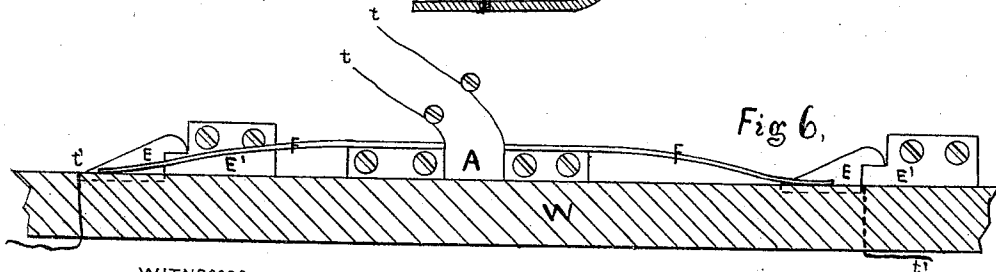


Fig 6,



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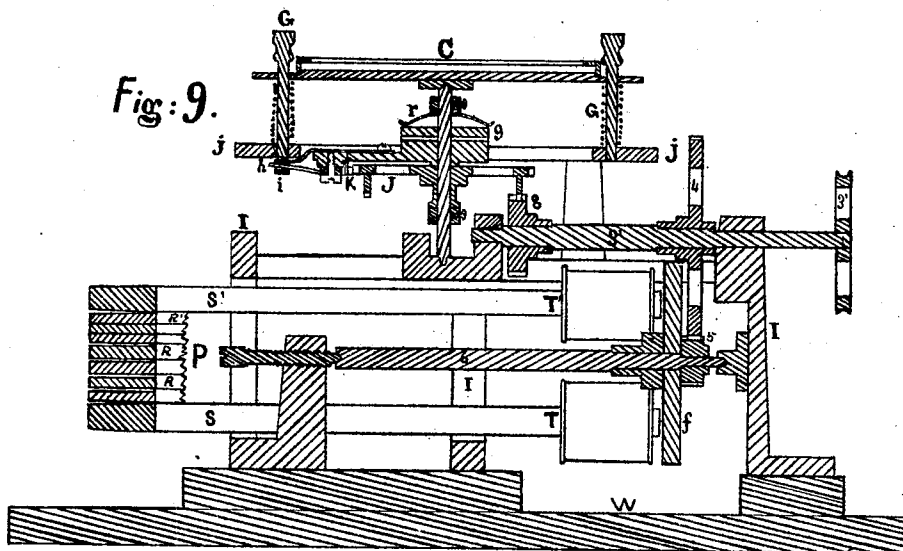
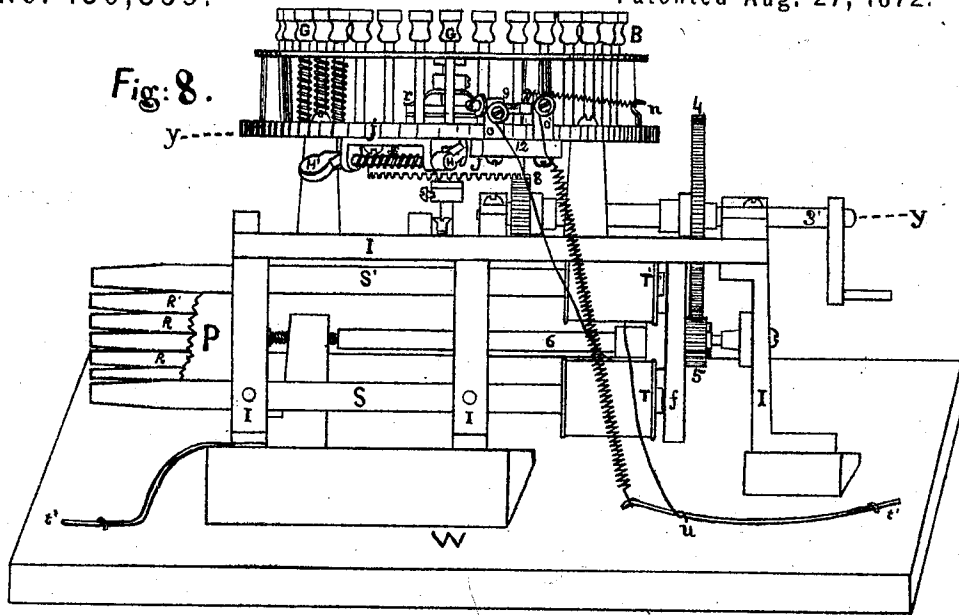
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UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN MAGNETO-ELECTRIC DIAL-TELEGRAPHS.

Specification forming part of Letters Patent No. 130,855, dated August 27, 1872.

Specification describing certain Improvements in Magneto-Electric Dial-Telegraphs, invented by JOHN B. JOHNSON, of Boston, in the county of Suffolk and State of Massachusetts, and HARRISON WHITEMORE, of Boston, in the county of Suffolk and State aforesaid.

Nature and Objects of our Invention.

The first part of our invention relates to a stop-key which has two parts, one of which is attached to the frame of the transmitter and the other, directly over it, to the box or cover. The first part consists of a bent lever, and is held in any desired position by means of a spiral friction-spring. The other part consists of a key and spiral spring arranged in such a manner that the said key, being depressed, strikes the bent lever and raises its opposite end so as to stop the revolution of the hook (hereafter referred to) and open the circuit at the star *. When the key is released it returns to its former position. Our invention further relates to the manner of attaching the case to the base and connecting the wires between these parts; and consists of hooks and springs having bearings upon the same, by means of which the wires are joined when the case is in position, thus allowing the case to be removed without disturbing the wires. It also consists in a sloping circle of keys, which are located radially around the dial, its object being to facilitate the operation of selecting the letters and characters to be indicated. Our invention, as a whole, relates to magneto-electric dial-telegraph instruments of the "step-by-step" description, wherein a circle of keys are employed to indicate the letters.

The advantages of this arrangement of the sloping circle of keys are the facility and ease with which it is worked, the operator being enabled to sit at the machine and manipulate the keys and work the treadle at the same time without obstructing his view of the dial.

Figure 1 is a perspective view of the case; also showing the alphabetical dial, stop-key, and index. Fig. 2 is a cross-sectional view through the machine and case, as indicated by the dotted lines in Fig. 1, *x x*. Fig. 3 is a top view of the machine, the case and dial being removed, showing the hooks and springs, also lower portion of the stop-key. Fig. 4 is

a detached view of a polarized electro-magnet and call-bells. Fig. 5 is a view of a portion of a permanent horseshoe-magnet, with poles screwed directly into the ends of the outer bars. Fig. 6 is a section view through the springs and hooks, by which the case is connected to the base and the circuit-wires are joined. Fig. 7 is a section view of the polarized electro-magnet. Fig. 8 is a rear-plan view of the transmitter complete, the case being removed, the intermediate bars of the permanent horseshoe-magnet being broken away to show the arbor carrying the armature. Fig. 9 is a transverse vertical central section through the same, as indicated by dotted lines *y y*, Fig. 8.

The frame I of the transmitter is secured to the base W in a position sloping forward, as shown in Fig. 2. Within the lower portion of this frame we affix a permanent horseshoe-magnet, P. We construct this magnet with thick steel bars S S' upon the outside, and screw the soft-iron cores T T' of an electro-magnet directly into the ends thereof. The intermediate bars R R may be of thinner steel, and more or less in number. Into suitable bearings in the frame I we affix an arbor, 3', with suitable mechanism for revolving the same. To this arbor we affix a large gear-wheel, 4, which gears into a small pinion, 5, upon an arbor, 6, to which is also attached a soft-iron armature, *f*. To the inner end of arbor 3' is attached a small gear, 8, which gears into the toothed wheel J, which is constructed with a circular gear upon its under side for the purpose. This latter toothed gear-wheel J is attached to an upright arbor, both ends of which have bearings—the bottom in a suitable step upon the frame I and the upper end in a bearing upon the under side of the dial-plate C, as shown in Figs. 2 and 9. Upon the arbor, immediately above the wheel J, is a projecting arm, L, which carries a hook, K, which engages with the hooked teeth upon the periphery of wheel J. This hook K is held in contact with said teeth by a spring, N, attached to the arm L also, to the opposite side of which is attached a weaker spring, M, and to the end is connected a loop, *i*, which surrounds the tail *h* of the hook K. Supported upon standards just above the arm L is a circular flat ring, *j*, surrounding the upright arbor, having an outside diameter somewhat larger than the

circle described by the outer end of the hook K. Through this ring *j* are drilled thirty holes, (equidistant,) and into these holes are fitted the bodies of the keys G so as to slide up and down freely. Surrounding these keys are spiral friction-springs, which have a bearing upon the top of the ring *j*. The upper portions or necks of the keys pass through corresponding holes in the dial C, above which they terminate with small heads. These keys may be pressed downward by the operator, so as to bring their lower ends into the path of the collar *i* surrounding the tail *h* of the hook K, and arrest the forward movement of the same by its contact with the lower end of the depressed key, thereby removing the pressure of spring N, by which the hook K is held in contact with the teeth of the revolving wheel J. By the continued movement of the arm L the hook K is turned upon its bearing until the arm L is stopped. The spring M then throws the hook K away from the wheel J a sufficient distance to prevent its "tripping or rattling" upon the teeth of the same. The friction contact-bar 9, which extends from the upright arbor referred to, is kept in close contact with the hub of the carrying-arm L by a friction-spring, *r*, and, by the rotation of the hub, is held against the stop *o*; but when the motion of arm L ceases, spring *n* brings the contact-bar against the stop *o'* and opens the circuit. The movement of contact-bar 9 is regulated at the outer end by a set-screw passing through stops *o* or *o'* which project from the top of the hard-rubber insulator 12. This insulator 12 is secured to the under side of the flat ring *j*, (see Fig. 8.) To the stop *o* is connected the end of the coil surrounding the core of pole T, and to stop *o'* is connected the wire from the coil surrounding the pole T', which also connects with the circuit-wire *t'* at the point *u*; the other circuit-wire *t'* connecting with the frame I of the transmitter. Attached to the under side of the ring *j* is a portion of the stop-key, which consists of a bent lever having a broad end, H', and the opposite end H anchor-shaped, the body between the two being surrounded by a coiled friction-spring, *g*, which retains the bent lever in any desired position. Upon supports above the flat ring *j* is attached the circular alphabetical dial C, which has arranged around it the twenty-six letters of the alphabet, abbreviations, and at the top an asterisk. At the top right-hand of the circle of keys B is a similar key, G'. This key G' is attached to the cover A, and when depressed its lower end strikes the broad end H' of the bent lever and brings its opposite end H in contact with the revolving hook K and opens the circuit at the asterisk or star-key, and stops the hands of the receivers (hereafter described) at that point, in which position messages may be received from a distant station. To the base W of the transmitter is attached the case, having a sloping cover, A, corresponding to the slope of the transmitter. Said case is provided with a cir-

cular opening corresponding with the dial C, and surrounds the circle of keys B which project above the same when in position. This case is connected to the said base W by means of hooks E E', which lock under plates upon the base. Upon the inner side of the case, near the bottom, are attached springs F F', whose free ends have a bearing upon the plates of hooks E E' on base W. To the fixed ends of springs F F' are soldered the circuit-wires *t* *t*, and to the plates of hooks E E' are soldered the wires *t'* *t'*, thus connecting the circuit between the wires upon the case and those upon the base W. To the sloping cover A of the case is attached the receiver D, which has a peculiarly-constructed polarized electro-magnet, U, with poles V V'. The bar of the magnet has parallel arms of nearly equal length, to the longer one of which is attached the poles V V', which extend across to near the shorter arm, where they terminate in iron caps. An arbor, having a pivoted bearing at its lower end, extends across from the longer arm to the shorter, where it is also journaled, and from this arbor extends a very short light tongue, which rapidly vibrates between the iron caps on poles V V'. To this tongue is connected a short arm with pin-pallets *y*, which propel the wheel *d* by pressing against the unequal sides of the teeth of said wheel. The teeth are V-shaped, and fifteen in number. This wheel is attached to an axis carrying the index-hand *e*. This axis is pivoted in a step at its lower end, and its upper end is journaled in the dial, over which the index-hand *e* revolves, and to which the hand is connected. To prevent the momentum of the index-hand from turning the axis to which it is connected, a small friction-spring, Z, is attached, so as to have a slight bearing upon the same. To the rear of the case is attached the alarm or call bells Q Q'. These call-bells are operated by a magnet exactly similar to the above-described polarized electro-magnet U³, with poles V³ V³. To its short vibrating arm is attached the wire *a*, terminating in a loop, *c*, which surrounds the wire carrying the hammer *b*. This hammer *b* is suspended between and in close proximity to the bells, and receives its motion from the short vibrating arm.

Operation of our Invention.

The transmitter being placed upon a suitable base, that power may be applied to drive the armature. In practice we place it upon a common sewing-machine table having a treadle, or in any other preferred way that power may be applied, to communicate rapid motion to the armature. This transmitter is contained in a suitable case, on the sloping upper surface of which is a circular dial-plate, surrounded by thirty equidistant keys. Upon this dial-plate are marked the twenty-six letters of the alphabet, several abbreviations, and at the top an asterisk; these are arranged around the circumference of the dial, making thirty divisions, or one for each key. Also,

upon the top of the case is the corresponding small dial of the receiver, which is exactly similar to the dial of the transmitter. This dial has a small index-hand or pointer turning with an axis through the center of said dial, and rotating in connection with the armature, which may be arrested at any letter by depressing one of the keys. Inside the case is the fixed permanent horseshoe magnet, placed horizontally, carrying on its poles four soft-iron cylindrical cores with their coils of wire, arranged at equal distances from each other in the circumference of a circle. On the arbor passing through the center of this circle, in connection with the crank or driving mechanism, revolves the soft-iron armature. When the armature revolves, therefore, it approaches one pole as it recedes from the one opposite, and thus induces simultaneously currents in the four coils. When a key is pressed down in the transmitter it arrests the index hand or pointer of the receiver at the letter corresponding with the one at the depressed key; this action of the depressed key opens the circuit at that letter. This is done by the arm attached to the arbor, which arm revolves underneath the dial, coming in contact with the lower end of the depressed key. Motion is imparted to the arbor carrying the arm by the gear-wheels, which engage with a pinion fixed to the arbor carrying the armature of the electro-magnet. The proportions are so adjusted that, for every current induced in the coils, the arm shall advance the distance of one letter on the dial. If, therefore, the arm start freely from the star, when the armature is in motion, and any key, as D for an example, be depressed, the rotation of the armature produces alternate electric waves while the arm passes under A, B, and C, respectively. Arriving at D the arm comes in contact with the depressed key and releases the hook and cuts off the passage of the subsequent currents until the key is released; then the carrier-arm is free to move, and travels on around under the circle of keys. The dial of the receiver before alluded to is divided into thirty equal spaces, exactly similar to the dial of the transmitter. On an axis in its center is a pointer, to which motion is given by a small wheel, which has fifteen unequal-sided teeth, which is carried

by a short arm with pin-pallets. This arm is connected to the end of a very short vibrating tongue, which lies between the caps of two small electro-magnet coils; the latter exercise mutual attraction and repulsion on the tongue as the positive and negative currents alternate, and thereby cause rapid vibrations of the same. The pin-pallets at the end of the vibrating tongue work to and fro and strike against the teeth upon opposite sides of the wheel, and thereby rotate the same. The electrical connections of all the coils of the transmitter and receiver are connected up in a common circuit. When the armature of the transmitter is revolved and the carrier-arm is free to move around beneath the circle of keys and dial, currents alternately positive and negative traverse the line at every letter which the arm passes beneath, moving the pointer-hand of the receiver correspondingly; but as soon as the carrier-arm is arrested by coming in contact with the depressed key the circuit is opened. The hands of the receivers therefore stand still upon the same place upon the dials until the key is released and the circuit closed by the contact-bar. At the side of the transmitter a switch is arranged, which, when placed upon a button, brings the alarm into circuit, the receiver being thrown out; but when moved upon the opposite button, the alarm or call-bells are out of circuit and the receiver works.

What we claim as our invention is—

1. The stop-keys G' and cover A, in combination with bent lever H H', spring g and frame I of the transmitter, when constructed to operate substantially in the manner as and for the purposes set forth.
2. The hooks E E' and springs FF', in combination with cover A, base W, receiver D, and call-bells Q Q', substantially in the manner as and for the purposes set forth.
3. The combination, with a magneto-electric dial-telegraph, of a sloping circle of keys, B, arranged radially around a corresponding sloping alphabetical dial C.

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