

J. E. SMITH.
Printing-Telegraphs.

No. 147,183.

Patented Feb. 3, 1874.

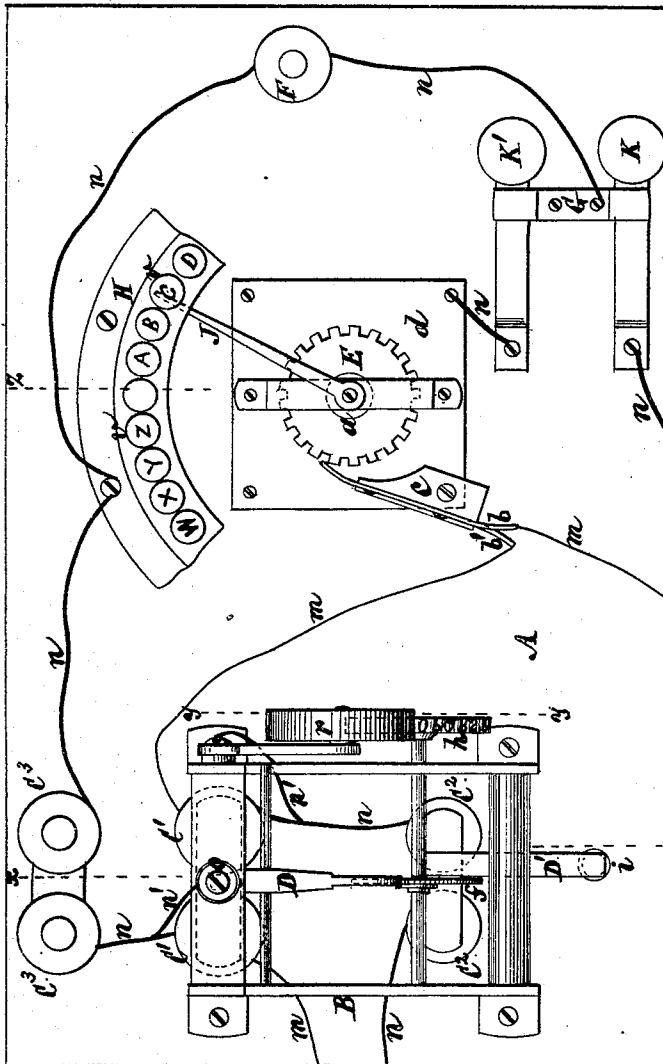


Fig. 1.

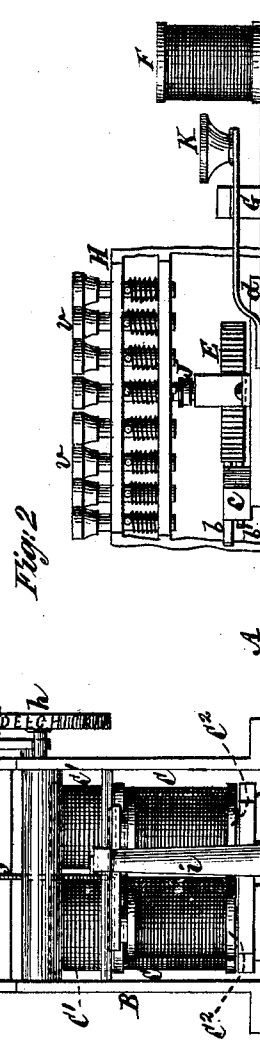


Fig. 2.

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Fig. 3

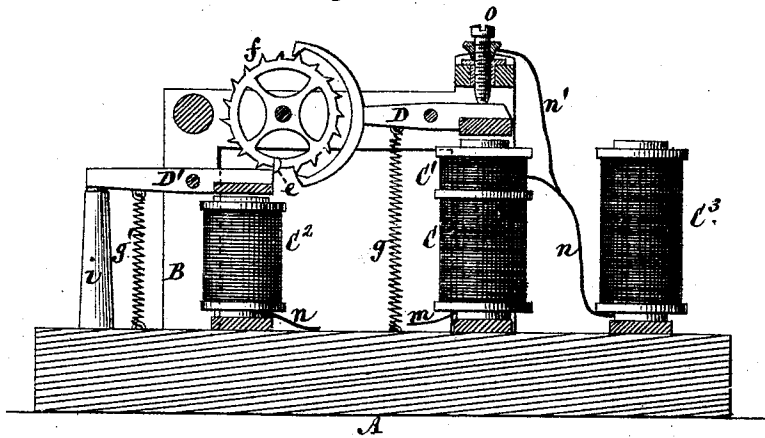


Fig. 4

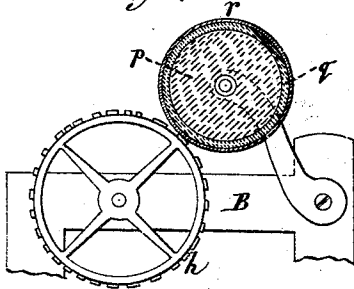


Fig. 6

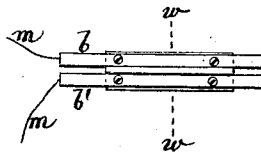
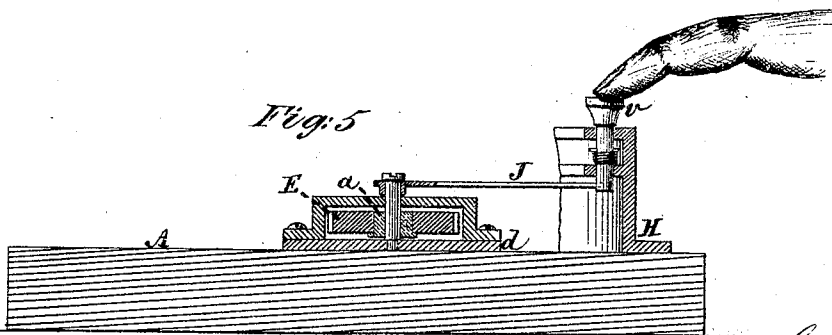


Fig. 7



Fig. 5



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UNITED STATES PATENT OFFICE.

JOHN E. SMITH, OF NEW YORK, N. Y.

IMPROVEMENT IN PRINTING-TELEGRAPHS.

Specification forming part of Letters Patent No. **147,183**, dated February 3, 1874; application filed May 15, 1873.

To all whom it may concern:

Be it known that I, JOHN E. SMITH, of the city, county, and State of New York, have invented certain new and useful Improvements in Electro-Magnetic Printing-Telegraphs, of which the following is a specification:

This invention relates to printing-telegraphs for use on short lines without the aid of local batteries. Said invention employs two line-wires, and the receiving or printing portion of each instrument has three electro-magnets. One of these—the type-wheel escapement-magnet—has two unequal windings of wire, the greater of which and the circuit-wheel of the transmitter are situated in one of the circuits. This, however, I do not claim. The other circuit is a constantly-closed one, (except when broken to operate the unison,) and in it are situated the smaller winding of the escapement-magnet, the unison and the printing magnets, a resistance-coil, with its shunt, and two extra keys, one of the latter being used for breaking the shunt in order to repeat any character, and the other serving to entirely interrupt the circuit for the purpose of operating the unison-magnet. Thus one of the circuits only helps to actuate the type-wheel escapement while the other circuit, in addition to such office, operates the printing and the unison levers. The inking-wheel is composed of cork and cloth, so as to offer a large inking-surface with little weight, and with general freedom from absorption of the ink to add to its weight.

In the accompanying drawing, which forms part of this specification, Figure 1 represents a plan of an apparatus embodying my invention; Fig. 2, a side view of the same; Fig. 3, a vertical section on the line *x x*; Fig. 4, a vertical section on the line *y y*, mainly in illustration of the construction of the inking-wheel; and Fig. 5, a vertical section on the line *z z*. Fig. 6 is an outside face view of a pair of springs, operating in connection with the circuit-wheel of the transmitter, for opening and closing the circuit; and Fig. 7, a cross-section of the same on the line *w w*.

Similar letters of reference indicate corresponding parts.

A is a wooden or other suitable base for the apparatus; or the transmitting and the receiv-

ing portions thereof may be mounted separately. B is a metallic frame, for holding the principal portion of the mechanism of the printing or receiving part of the instrument. C and C¹ are the two windings of the type-wheel or escapement-magnet. The drawings represent the smaller winding, C¹, as being near the poles of the magnet, though in practice I would have both windings extend the whole length of the core, one inclosing the other, but the two wholly insulated from each other. This magnet is so wound, or the circuits so connected with it, that the two currents pass around the core in opposite directions. The object of the smaller winding, C¹, is to cause the magnet to rapidly and thoroughly discharge when the current through the other winding is broken by the circuit-wheel of the transmitter. The armature of this magnet is attached to one end of the escapement-pallet lever D, which, when vibrated by the action of said magnet and the retracting-spring *g*, allows the ratchet-wheel *f* to rotate with a step-by-step movement. On the shaft of the wheel *f* is fixed the type-wheel *h*. These wheels *f* and *h* are rotated by a train of clock-work, driven by a weight or spring, (not shown in the drawings,) as in various other telegraphs. C² is an ordinary electro-magnet, whose armature-lever D', when drawn against the post *i* by the retracting-spring *g'*, catches the pin *e* on the side of the ratchet-wheel *f*, to set the type-wheel in unison with the transmitter. C³ is an electro-magnet, for actuating the printing-lever and the paper-feed, which latter devices may be similar to those heretofore employed, and consequently there is no necessity here to show or describe them. In the transmitter E is a circuit-wheel, which may be rotated by clock-work, operated by any convenient power. This wheel is insulated on its shaft by a ring of rubber, or other non-conductor, *a*. Said circuit-wheel and the escapement-wheel *f* have each but half as many teeth as there are characters on the type-wheel, so that to either one opening or closing of the circuit in which the helices C C are situated the type-wheel will advance one whole character. The flat springs *b b'*, that work in connection with the circuit-wheel E, are insulated from each other, and from the bed-plate *d*, by a block of rubber, *c*. The ro-

tation of the teeth of the wheel E against these springs opens and closes one of the circuits to operate the escapement or type wheel magnet. The shaft of the wheel E carries an arm, J, the outer end of which passes closely underneath the circle of letter-keys *v* corresponding with the characters on the type-wheel, certain only of which keys are shown in the drawings. Each of these keys, when depressed, checks the arm J, as in various other telegraphs, half of them arresting the wheel E with one of its teeth in contact with the springs *b b'*, and the other half leaving said springs disconnected, as represented in Fig. 1. These letter-keys are of metal, or at least such portion of them as passes through the metallic supporting frame or ring H; and the contact of the arm J with each of said keys completes a shunt to the resistance-coil F, as described in Letters Patent No. 120,116, granted to me October 17, 1871, and for the same purpose, viz., to increase the strength of the current to operate the printing-magnet. G is a piece of metal, with two ears projecting in opposite directions, with which ears the strap or spring keys K K' make electrical contact. The circuit in which the larger helices of the escapement-magnet are situated is shown in the drawings by the lighter lines *m*, and the other circuit, in which are the printing-magnet C³, unison-magnet C², and the smaller helices C¹ of the escapement-magnet, is represented by the heavy lines *n*. The wires *n' n'* are branches of the circuit *n*, one of said wires connecting with the insulated screw *o*, and the other with the frame B, so that when the pallet-lever D strikes the screw *o*, the current will be shunted from the helices C¹ C¹ of the escapement-magnet. The object of this shunting is to keep the printing-current from moving the escapement-armature when the circuit-wheel is arrested to print a character with the circuit *m* open.

With this telegraph, as with the Morse, the batteries may be located wherever most convenient, and, if placed at a terminal station, both circuits may be operated from one battery, if connected between the instrument and the ground.

The operation is as follows: While the rotation of the circuit-wheel E opens and closes the circuit *m* to actuate the type-wheel escapement in the other circuit, *n*, there is a constant, but feeble, current passing over the key K, through resistance F, to the ring H, and thence through the printing-magnet C³, the smaller helices C¹ of the escapement-magnet, and the unison-magnet C². This feeble current is sufficient to overpower the delicate spring *g'*, thus holding the lever D' out of the path of the pin *e*, but not sufficiently powerful to interfere with the release of the printing-lever. This weak current, by passing around the escapement-magnet in a direction opposite to that in the circuit *m*, causes a more rapid discharge of said magnet, and consequent release of its armature, than could otherwise be obtained, and admits of a weaker retracting-

spring being used. When the transmitter is checked by any depressed letter-key, with the circuit *m* either open or closed, the contact of the arm J with such key shunts the resistance F, when the current passes over the key K, the piece G, the key K', the bed-plate *d*, the shaft of the wheel E, the arm J, the depressed letter-key, and so on through the three magnets, as heretofore described, but now with sufficient force to actuate the printing-lever. To repeat the impression of any character while the type-wheel and the transmitter remain motionless, it is only necessary to break the shunt to the resistance F by depressing the key K'. The type-wheel may be set in unison with the transmitter by allowing the latter to make two revolutions after the current over circuit *n* has been completely interrupted by the depression of the key K. Such break of the circuit *n* allows the spring *g'* to draw the end of the lever D' into the path of the pin *e* on the escapement-wheel, and thus to arrest all type-wheels relating to that circuit at some predetermined letter or point. The strong current caused to pass over circuit *n*, by the arrest of the arm J by the corresponding key, will release all the type-wheels and leave them in harmony with the transmitter.

To explain the nature of my improvement in the inking-wheel, it should be observed that the speed of a step-by-step printing-telegraph, with a limited power applied, is largely dependent on the weight of the inking-wheel. Such wheels have been made with a cavity to be filled with ink, but these are not only too heavy, but are liable to flood the type-wheel. Others have been formed of a disk of thick felt, or of several disks of cloth bound together, but these also become too heavy from the absorption of ink, much of which is too far from the surface to be serviceable.

To obviate these difficulties I take a disk of cork, *p*, put a light metallic hub in the center to receive a shaft on which it may revolve. Then on the periphery of the cork disk I sew, or cement, or both, a band or two of thick porous cloth, or similar material, *q*, to act as a reservoir for the ink. Outside of such band or bands of heavy cloth I then sew one band of light fine smooth cloth, *r*, (good broadcloth, for instance,) through which the ink will be slowly given off to the type-wheel. The cork body of such a wheel will not become heavy by the absorption of useless ink, especially if given a coat of shellac varnish. In this manner I am enabled to produce a very light wheel with a large inking-surface, which also possesses the advantage of riding over the type more smoothly than a wheel of smaller diameter, especially if there be a blank on the type-wheel. Several lines may be operated by one transmitter, by placing as many circuit-wheels in such instrument, and by arranging the arm J to open and close a local circuit through a corresponding number of relays, the armature of each relay to perform the shunting of one of the resistance-coils, but

I have not thought it necessary to illustrate this in the drawing, as such is a mere duplication of mechanism already shown, and the same, from the description previously given, will be readily understood by electricians generally.

What is here claimed, and desired to be secured by Letters Patent, is—

1. The insulated screw *o* and wires *n' n'*, in combination with the helices *C¹ C¹* and the lever *D*, essentially as herein set forth.

2. The magnet *C²*, and lever *D'*, in combination with the pin *e* and the key *K*, substantially as specified.

3. The key *K'*, situated in a shunt-circuit of the resistance *F*, to cut the same out of circuit, essentially as described.

4. The combination of the magnets *C³ C³* and helices *C¹* with the circuit *n* and resistance *F*, substantially as specified.

5. The combination of the magnets *C C² C³*, the lines *m* and *n*, the wheel *E*, the arm *J*, and the key-frame or ring *H*, essentially as described.

6. An inking-wheel, the body of which is composed of cork covered with cloth, substantially as and for the purposes specified.

J. E. SMITH.

Witnesses:

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