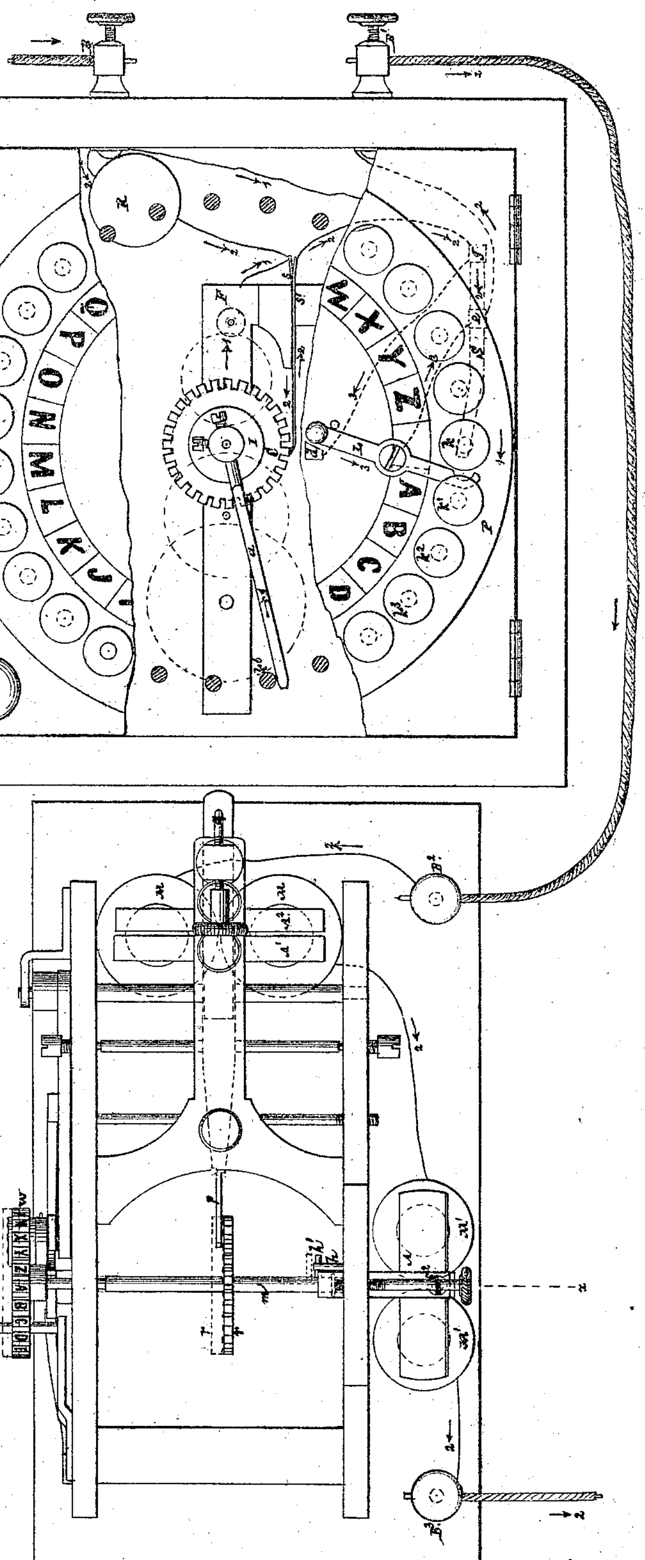
JOHN E. SMITH.

Improvement in Printing Telegraphs.

No. 120,116. Patented Oct. 17, 1871.

Fig. 1.



Witnesses:

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R. H. Rabeau

John E. Smith

JOHN E. SMITH. 3 Sheets--Sheet 2.

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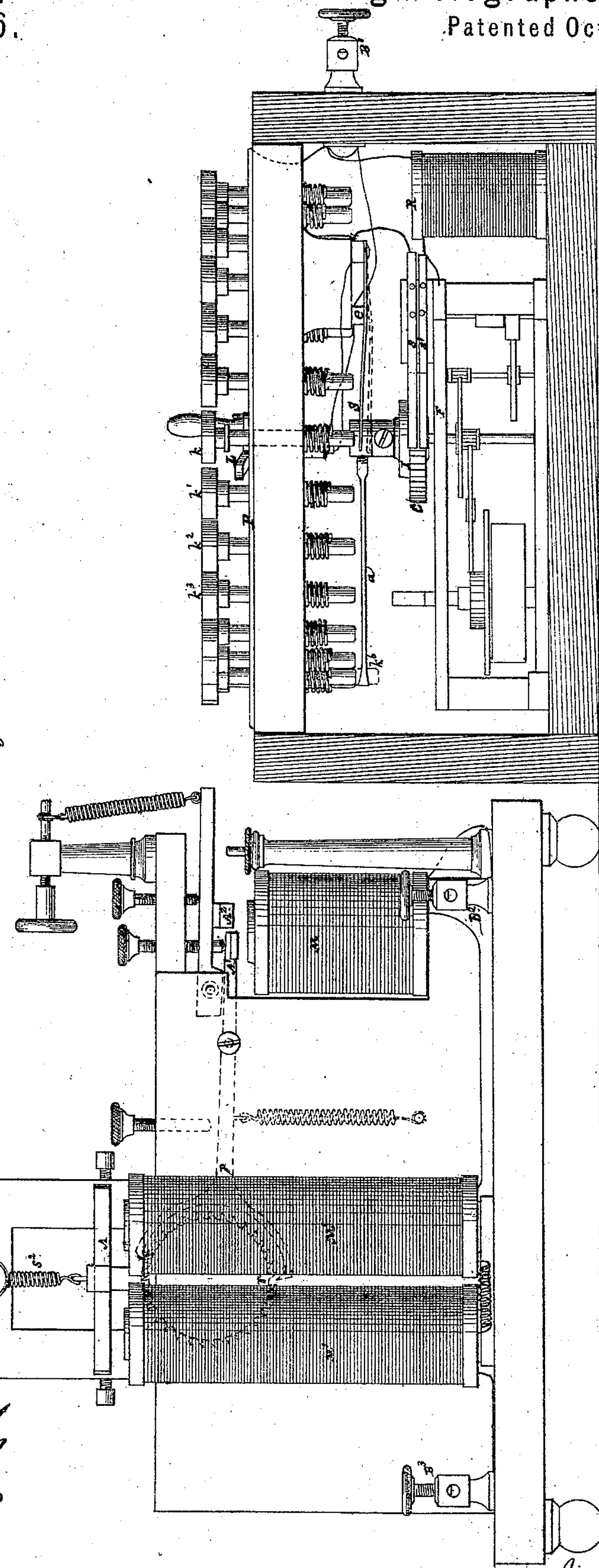
Fig: 2.



Witnesses:

J. W. Coomb[illegible]

R. [illegible]

John E. Smith

AM. PHOTO-LITHOGRAPHIC CO. N.Y. (OSBORNE'S PROCESS.)

3 Sheets--Sheet 3.

JOHN E. SMITH.

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Fig: 4.

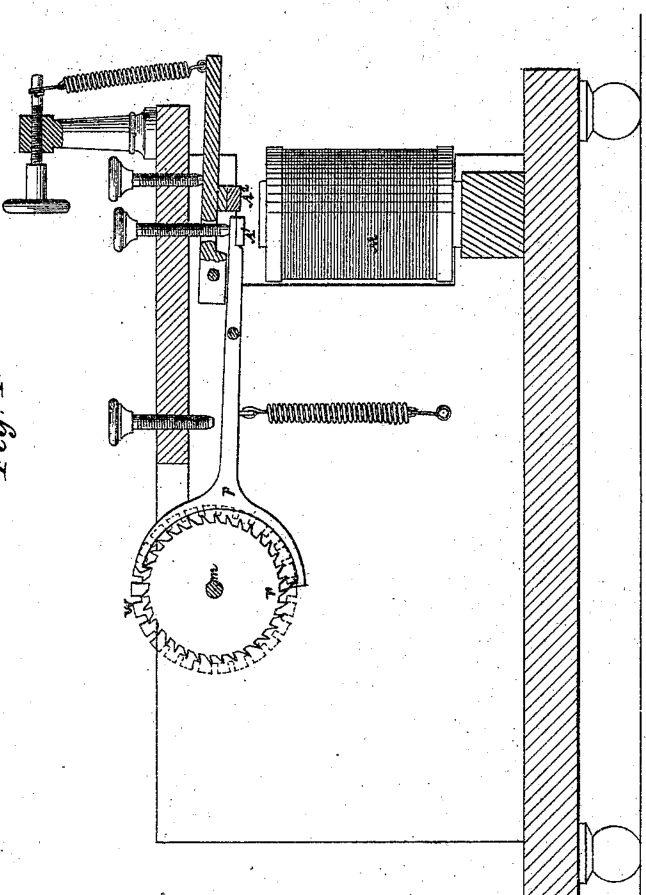
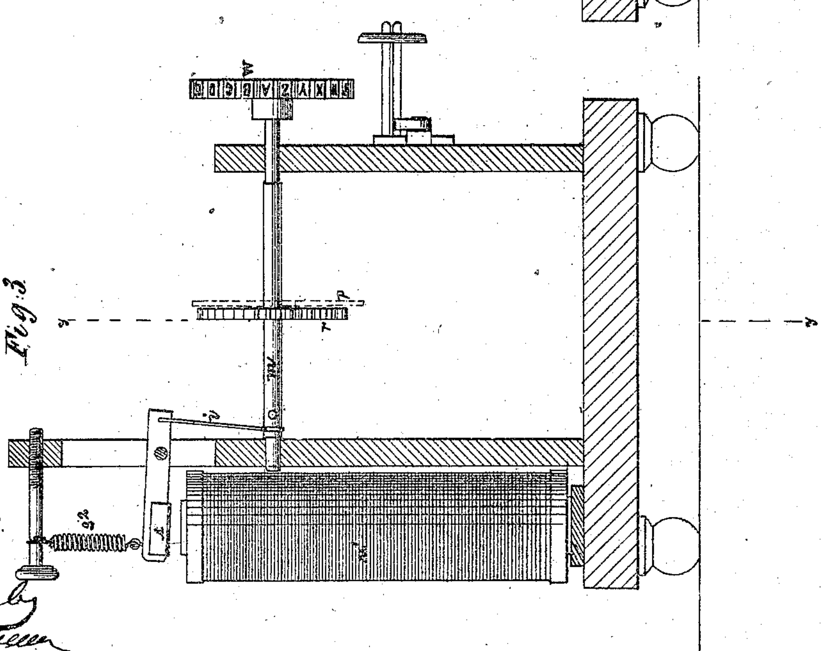


Fig: 3.



Witnesses.

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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. 120,116, dated October 17, 1871.

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 Printing-Telegraphs; and do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing forming part of this specification, and in which—

Figure 1 represents a plan of a printing-telegraph, constructed in accordance with the invention; Fig. 2 a side elevation of the same, with its box or case in section; Fig. 3 a vertical section taken as indicated by the line *x x* in Fig. 1; and Fig. 4 a vertical section taken as denoted by the line *y y* in Fig. 3.

Similar letters of reference indicate corresponding parts throughout the several figures of the drawing.

Among the different descriptions of printing-telegraphs heretofore devised, some, as used for short lines, require two or three lines or main circuits to operate them; some need one or even two main batteries at every station, and nearly all require the joint attendance and skill of both the sending and receiving operators to bring the type-wheels of their respective instruments into unison. My invention, excepting when used on long lines, requires but one main battery, and that may be located at any station, as in the Morse system, and it gives each station the power of bringing distant type-wheels into unison with its own; all this, too, needing but one main circuit. To these ends the invention consists in a combination of an electro-magnet with the shaft of the ratchet and type-wheel of the instrument, whereby the operator, at any station, is enabled to bring the type-wheels of distant instruments into unison with his own. The invention also consists in a combination of one of the regular transmitting keys with a circuit-breaker, whereby the type-wheel unison mechanism may be frequently operated without any special attention or effort on part of the operator for that purpose. The invention likewise consists in a resistance-coil applied to the transmitting portion of the apparatus, and so arranged and operated that, with but one main battery, the strength of current at any of the stations within its circuit can be varied as required to control the printing levers. The invention furthermore comprises other combinations of devices operating as switches, the transmitting keys, the circuit-wheel and their connections, for the purpose of more perfectly or fully carrying out the principles and mechanical actions, as above stated.

In proceeding now to describe the invention, as represented in the accompanying drawing, I would here briefly remark that the general construction of the apparatus and many of its details being common to other printing-telegraphs, no special description will here be made of the same.

In the receiving portion of the instrument the improvement is restricted to a magnet, M′, and its connection with and action on the shaft, to which the ratchet-wheel *r* and the type-wheel W are fastened. This electro-magnet M′ is considerably longer than the regular magnet M that controls the printing levers and pallet *p* of the ratchet-wheel, so that the magnet M′ will demagnetize more slowly than the magnet M. For the same purpose I allow the armature A of the magnet M′ to approach the poles very closely when the circuit is closed, but keep it from actual contact with them by facing said armature with a thin piece of copper or some other non-magnetic substance. A post with adjusting-screw might, however, be employed as in different electro-magnetic apparatus. Said armature A is drawn from the magnet M′ by a spring, s^2. To the back end of the lever portion of the armature A is secured a piece of metal or forked arm, *i*, arranged to fit at its lower end within a groove in the type-wheel shaft *m* of the apparatus. This shaft *m* is made capable of a longitudinal movement to an extent slightly in excess of the width of the pallet *p*. Attached to the frame of the instrument, near the type-wheel shaft, is a pin, *h*, and secured to said shaft a pin, *h′*, which latter is caught by the pin *h* whenever the ratchet-wheel *r* is thrown out of gear, as hereinafter described. The motive power which turns said shaft and wheels may be a spring or weight arranged to drive an ordinary train of clock-work, not shown in the drawing. In the transmitting portion of the apparatus, C is the circuit-wheel, which may be driven by simple clock-work moved by a spring or weight. This circuit-wheel is insulated by a non-conductor, I. To the shaft of said wheel is fastened a metallic arm, *a*, which is checked in its movement by the depression of

any of the keys K, K^1, K^2, &c. All these keys pass through a metallic plate, P, and are in electrical connection with it. Two similar flat springs, *s s'*, are insulated from the frame of the clock-work and from each other, but are put into electrical communication by touching one and the same tooth of the circuit-wheel C, as the latter rotates. R is a coil of wire, the resistance of which may vary considerably; but I prefer to have it equal to one-third the resistance of the whole line, exclusively of said resistance coil or coils. S is a flat spring making and breaking circuit at a point, *e*, as said spring is moved by the action of the key K. L is a lever and switch for holding the key K down to stop the clock-work when not transmitting, and at the same time closing the circuit at a point, *d*, to compensate for the interruption made at *e* by the depression of the key K. The arm *a* should be so set on the circuit-wheel shaft that when stopped by depression of any of the keys the springs *s s'* will rest on one of the teeth of the circuit-wheel. The battery may be stationed at any point on the line with the poles in either direction.

The operation is as follows: When everything is properly connected and adjusted, and the line is idle with closed circuit, the key K, which stands for blank in the series, is held down by the lever L, and the key K made to check the arm *a*. The key K will also press down the spring S, thereby breaking circuit at *e*, but closing circuit at *d*. This being the disposition of parts, the current will now enter at the binding-screw B, for instance, and pass, as indicated by the first arrow marked 1, to the plate P, down the key K, along the arm *a*, through the shaft of the circuit-wheel C, and frame F of the clock-work, and connecting-wire to the spring *s*, all as indicated by the several arrows marked 1 in Fig. 1. From the spring *s* the current then passes as denoted by the arrows Z—that is, first to the circuit-wheel C and back over the spring *s'*, and by connecting-wire to the point *g;* from thence, as indicated by an arrow 3, to the point *d;* from *d* to the lever L, and from L to *e*. From this point the current passes, as indicated by an arrow Z, to the binding-screw B^1, and by wire to the screw B^2, from whence it passes, as indicated by arrows 2, to the magnet M, to the extra magnet M', to the binding-screw B^3, and from thence out of the office. The current in moving from the screw B to the spring *s* in this route avoids the coil R, on account of its much greater resistance. The magnets M and M' being both charged, their armatures will be drawn toward them, the magnet M' serving to hold the ratchet-wheel *r* in gear with the pallet *p*, as shown by dotted lines in Fig. 1. The armature A^2 being attracted by the magnet M the printing lever holds the paper against the type-wheel. All instruments in circuit are in the same condition, and all stations not transmitting have the key K of their instruments held down by the lever L. When a message is sent from an office the lever L is kept removed from the key K and point *d*, and the operator presses down the key nearest the letter he wishes to make, and holds it down until, in the revolution of the circuit-wheel, it checks the arm *a*. While the circuit-wheel C rotates the circuit is closed every time a tooth touches the springs *s s'*, and while so closed the current passes from the binding-screw B, as shown by arrows 2, through the resistance R to the spring *s*, through the circuit-wheel C, back over the spring *s'* to *g;* from *g* to *e*, to B^1 B^2, magnets M M' to B^3, and out of the office. The current goes through the resistance R, because the shunt route is complete only while the arm *a* touches one of the keys. While the current is thus being opened and closed rapidly with the resistance R in circuit, as when transmitting, the magnet M has strength enough to operate the lighter armature A', so as to let the ratchet *r* and type-wheel W turn, step by step, but has not power enough to move the printing-armature A^2, which is controlled by a spring of greater tension. These rapid openings and closing of the circuit do not give the longer magnet M' time to fully demagnetize; hence it holds its armature A steadily down, which keeps the ratchet-wheel *r* in gear with the pallet *p*. When the arm *a* reaches the depressed key the contact of the two completes the shunt of the resistance R, so that the current avoids R, as hereinbefore described. This lessens the resistance of the circuit, and the strength of the current and magnets is correspondingly increased, sufficiently so to enable the magnet M to actuate the printing-armature A^2, and bring the paper against the type-wheel. In this way, or by these means, all the letter keys, according as either one is depressed, check the arm *a* and shunt the resistance coil, but the key K, which is opposite the blank, or the blank key as it may be termed, in addition to performing this function, interrupts the current at *e* by its action on the spring S. This key K is used to make spaces between words, and to bring the type-wheels of the several instruments in the circuit into unison. The action of this key serves to keep the circuit open long enough to allow the magnet M' to demagnetize and liberate its armature, and in doing this the ratchet-wheel *r* is, by its connections as described, thrown out of gear with the pallet *p;* the type-wheel shaft *m* then slips around by the action of the clock-work until stopped by the contact of the pins *h h'*, and these pins and the type-wheel have such a relative position with each other that the type-wheel is stopped with its blank space opposite the printing point. The spring S is so adjusted that it closes circuit at *e*, early in the upward movement of the key K, so as to actuate the printing-lever to draw the paper for the space between words before the arm *a* is released. Thus the key for blank is also the key for bringing the type-wheels of the several instruments in circuit into unison, so that if they happen to fall out of unison at any time they will be righted before commencing to print the next word. When there are but two stations or offices on the line, the usual "calling" before transmitting a message is not necessary in the use of my invention. The sender can strike the key for blank two or three times, so as to be sure that the type-wheels of the instrument are brought into unison, and

to insure a good inking of the type-wheels before starting the message. It will be evident to telegraphers of ordinary experience and ability that instead of the blank key K, a special extra key may be used to operate the unison mechanism; also that the circuit-wheel C may be arranged to be turned by hand instead of by clock-work; likewise that the resistance R may be shunted by a switch also operated by hand; that either or both the magnets M M′ may be worked by local circuits; and that two main circuits may be employed—one for the magnet M, and the other for the magnet M′; and that sundry other modifications may be adopted without changing the characteristic features of the invention.

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

1. The combination of the magnet M′, with the ratchet-wheel *r* of the type-wheel shaft, and shifting devices or connections, whereby said magnet is made to throw the ratchet-wheel into and out of gear with its pallet *p*, to bring the type-wheels of the several instruments in circuit into unison, substantially as specified.

2. The combination, with the transmitting portion of the instrument, of a resistance, R, arranged to vary the strength of the current from a distant battery to control the action of the printing-lever, essentially as herein set forth.

3. The combination, with the resistance R, of the arm *a*, the frame F, the plate P, and blank and letter keys of the instrument, whereby the contact of said arm with any of said keys completes a shunt to the resistance R, substantially as specified.

4. The combination, with one of the keys of the instrument, of the spring S, or its equivalent, whereby on depressing said key it is made to check the motion of the arm *a* and circuit-wheel C; also by holding the circuit open to release the armature A of the magnet M′, essentially as described.

5. The lever and switch L in combination with the key K, and points *d* and *e*, whereby said lever serves to hold down the key and to close the circuit at *d*, so as to compensate for the interruption at *e* by the depression of the key, substantially as specified.

6. The combination of the spring S, the lever L, the resistance R, the arm *a*, the circuit-wheel C, the keys K K^1 K^2, &c., the magnet M′, the ratchet-wheel *r*, on the type-wheel shaft, and the pins *h h′*, essentially as and for the purposes herein set forth.

JOHN E. SMITH.

Witnesses:
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(50)