No. 720,668.

PATENTED FEB. 17, 1903.

L. CEREBOTANI.

PRINTING TELEGRAPH.

APPLICATION FILED JULY 3, 1899.

NO MODEL.

3 SHEETS—SHEET 1.

Fig. 1.

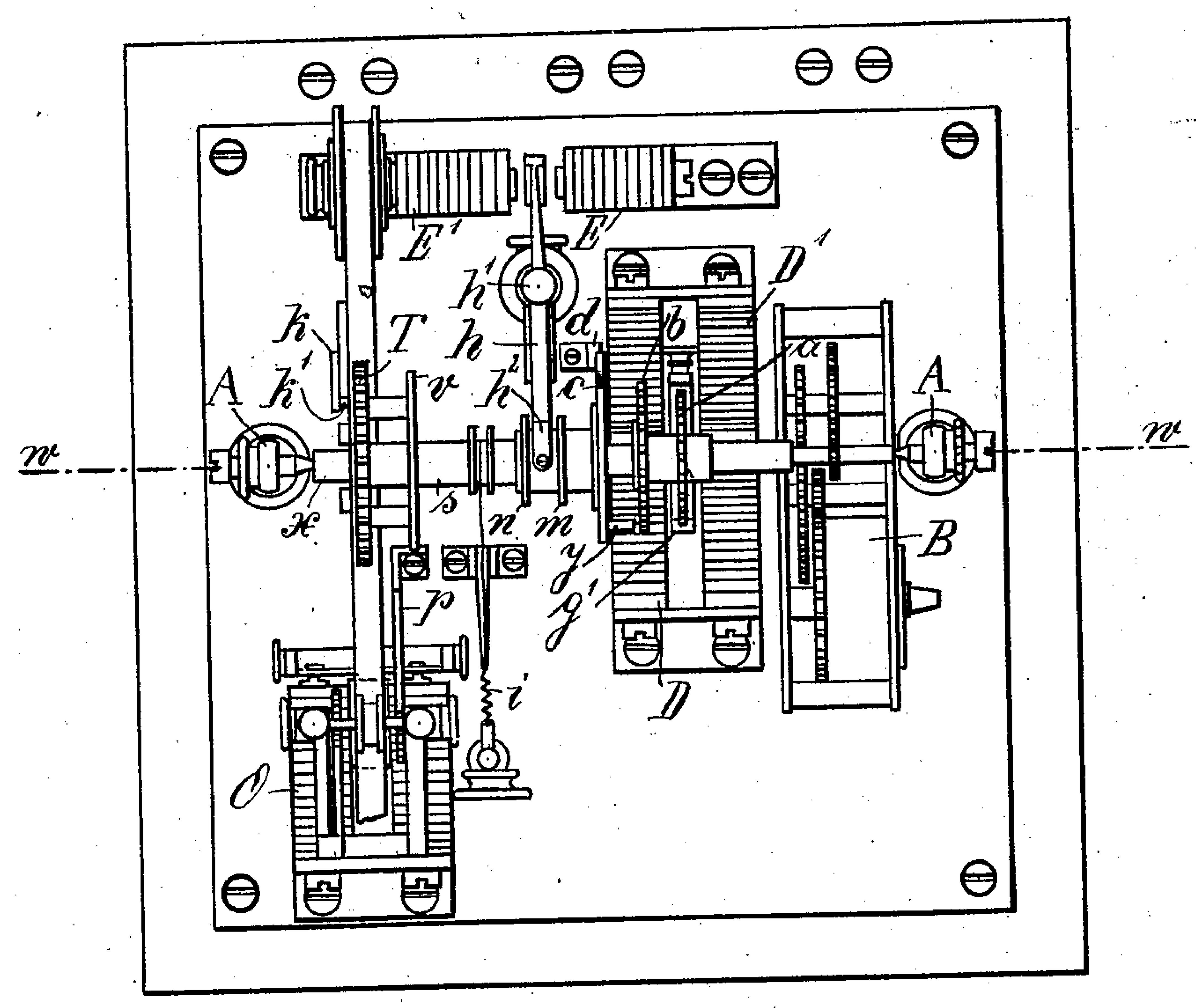
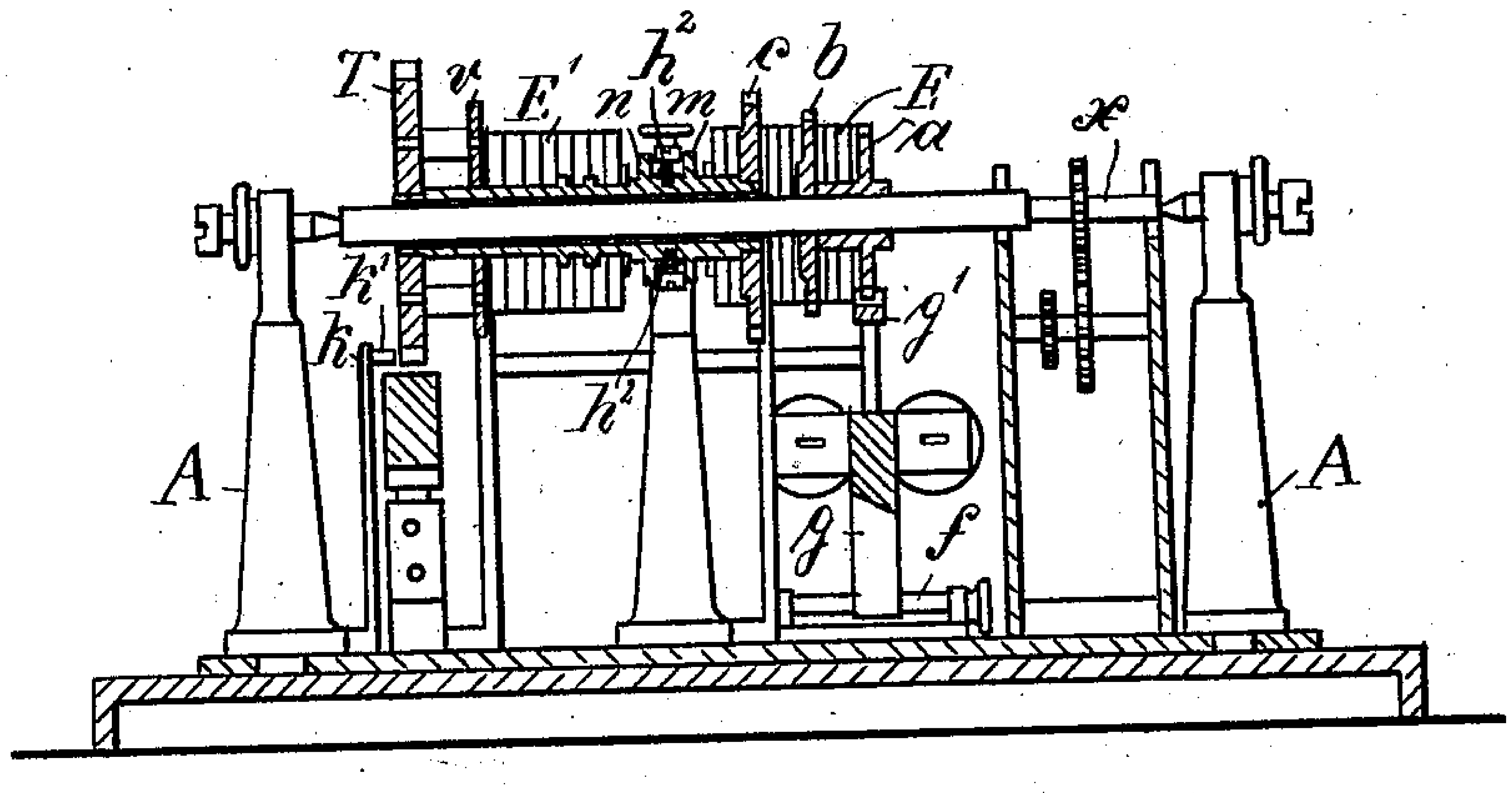


Fig. 2.



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PRINTING TELEGRAPH.

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NO MODEL. 3 SHEETS—SHEET 2.

Fig. 3.

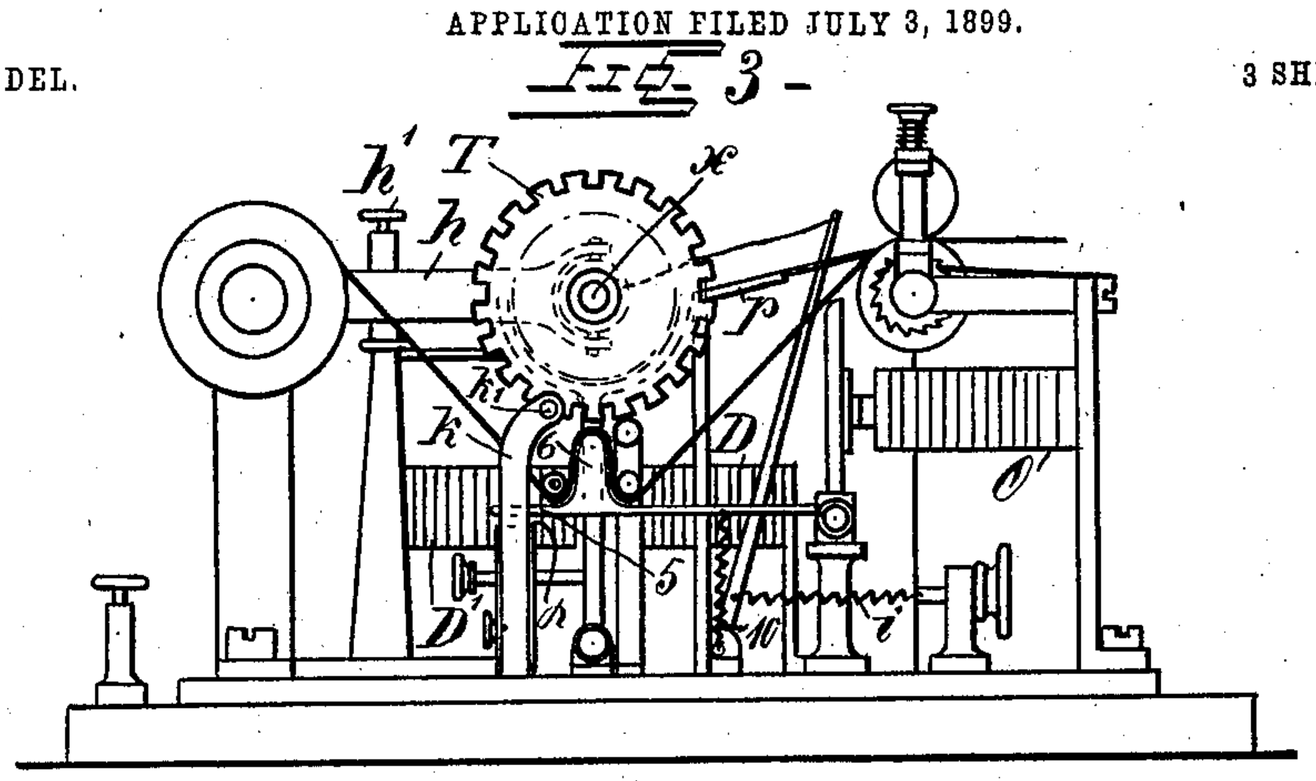


Fig. 4.

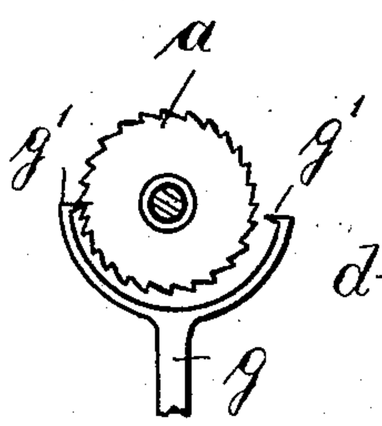


Fig. 5.

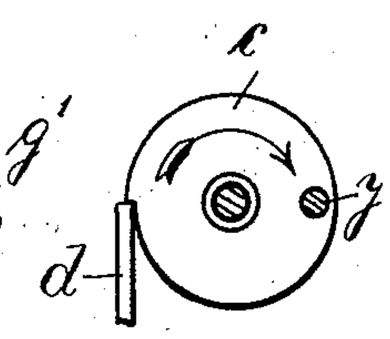


Fig. 6.

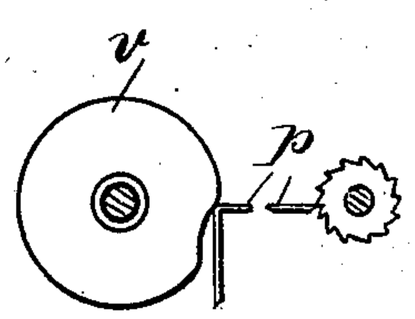
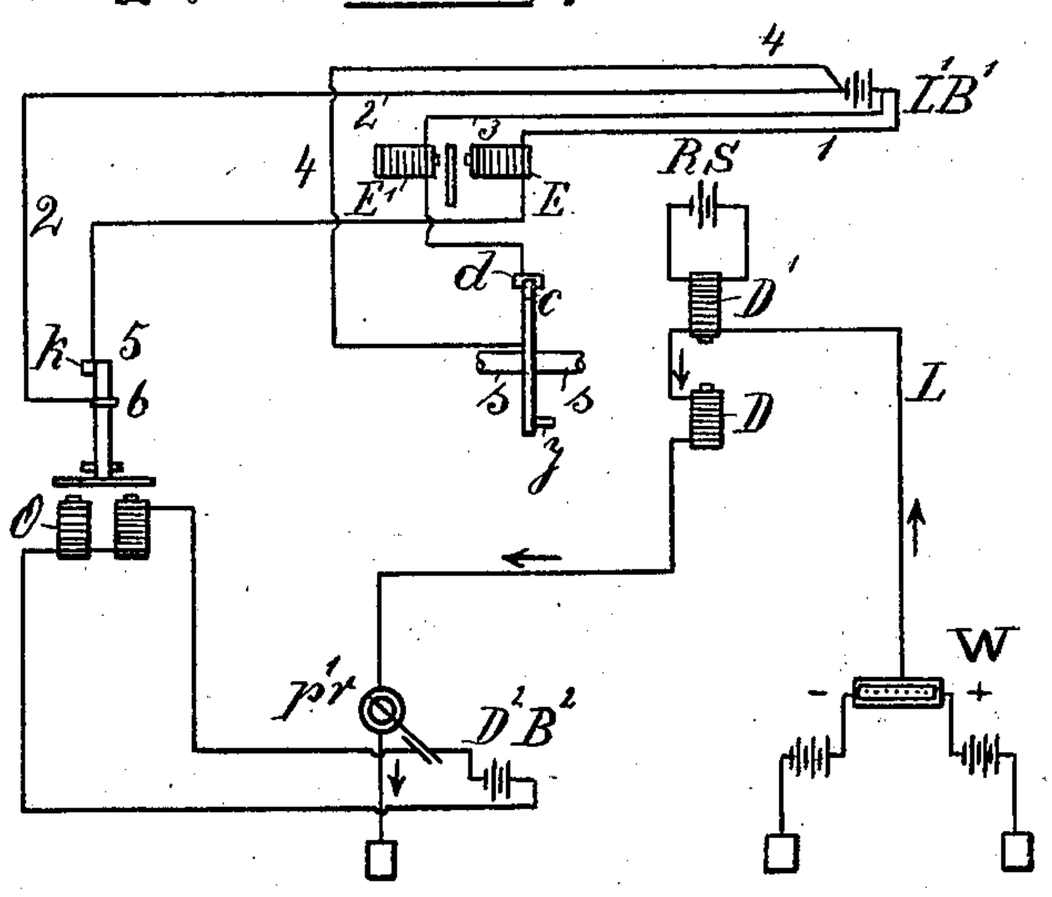


Fig. 7.



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PRINTING TELEGRAPH.

APPLICATION FILED JULY 3, 1899.

NO MODEL. 3 SHEETS—SHEET 3.

Fig. 12.

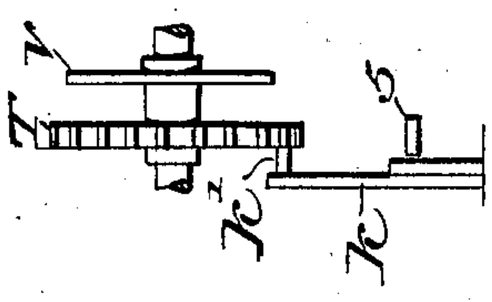


Fig. 11.

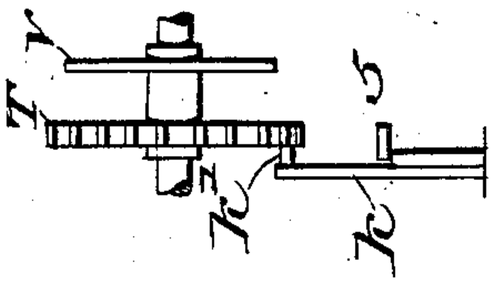


Fig. 10.

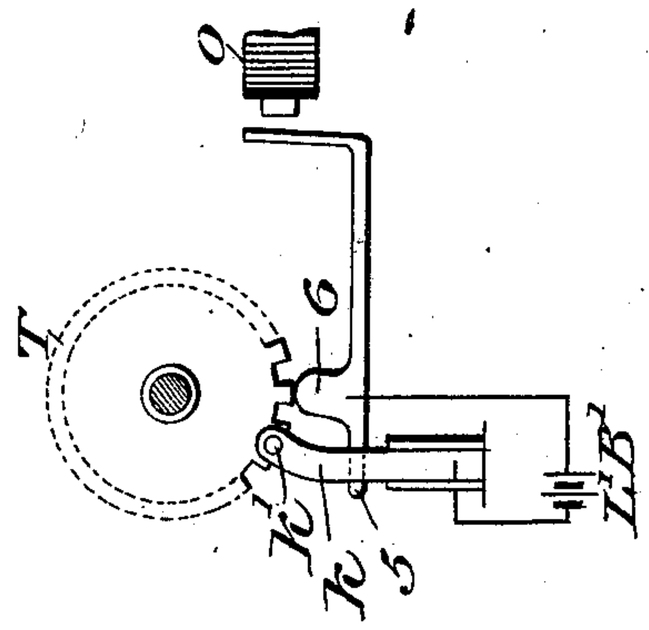


Fig. 9.

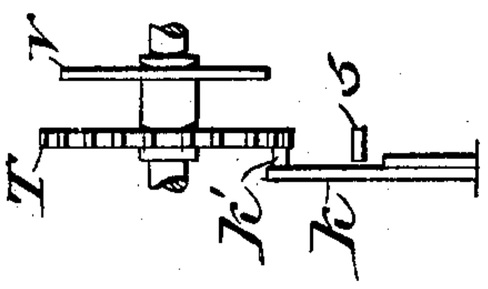
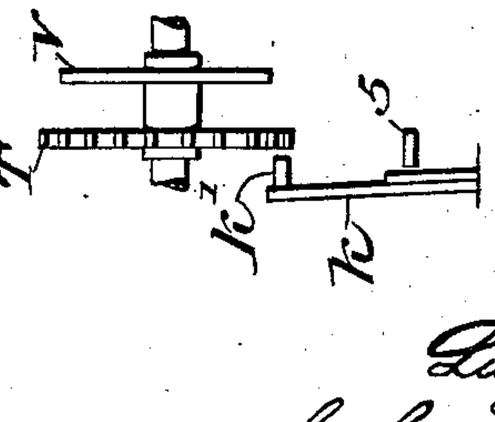


Fig. 8.



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UNITED STATES PATENT OFFICE.

LUIGI CEREBOTANI, OF MUNICH, GERMANY.

PRINTING-TELEGRAPH.

SPECIFICATION forming part of Letters Patent No. 720,668, dated February 17, 1903.

Application filed July 3, 1899. Serial No. 722,751. (No model.)

To all whom it may concern:

Be it known that I, LUIGI CEREBOTANI, professor, a subject of the King of Bavaria, residing at Munich, in the Kingdom of Bavaria, in the German Empire, have invented new and useful Improvements in Printing-Telegraphs, of which the following is a specification.

The subject of the present invention is a printing-telegraph for use in local and suburban communication and in telegraphing over short distances generally where a synchronous movement of the wheels at the two terminal stations is not necessary.

The transmitter consists of a keyboard, which when one of the keys is depressed transmits a number of current impulses, which have the effect of adjusting the corresponding letter, another impulse of current in the opposite direction following and printing the letter, so that in transmitting a telegram it is only necessary to depress one key after the other.

The receiver consists of an apparatus of novel construction and comprises, essentially, a shaft rotated by clockwork, having mounted fast upon it an escapement-wheel and a coupling-wheel, and mounted loosely upon it a sleeve with coupling-wheel, controlling disks or wheels, feed device for the paper ribbon, and printing-wheel mounted fast upon it.

The peculiar features characterizing the receipt of a message consist, first, in the action of an escapement-wheel on a shaft which is released from the said escapement-wheel after printing of the letter; second, in the automatic coupling and uncoupling of this escapement-wheel by means of two current impulses from a local battery; third, in the coöperation of two polarized peculiarly-constructed electromagnets, of which only one responds to, for instance, positive-current impulses and effects adjustment of the printing-wheel, while the other responds only to negative-current impulses and effects printing.

The new apparatus is shown on the accompanying drawings.

Figure 1 is a plan view; Fig. 2, a vertical section on the line *w w*, Fig. 1; Fig. 3, an end elevation; Fig. 4, a detail view showing a side elevation of the escapement-wheel *a*. Fig. 5 is a like view of the coupling-wheel *c*. Fig. 6 is a like view of the feed device *v*. Fig. 7 is a diagrammatic view showing the arrangement of the circuits. Figs. 8 to 12 are detail views showing the form of the printing-wheel before, during, and after printing of the letter.

A A are two uprights in which is mounted the shaft *x*, driven by clockwork B. On the shaft *x* are rigidly mounted the wheels *a b*, and the sliding sleeve *s* is loosely mounted on it. The wheel *a* is controlled by an anchor-escapement *g*, mounted on a short spindle *f*, Fig. 2. This escapement moves between two electromagnets D D′, and according to the induction of the one or other of the latter is attracted to such magnet, so that the anchor-escapement oscillates to and fro. In this manner one or other of the pallets *g′*, Fig. 4, engages in the teeth of the wheel *a*, which is thus rotated through a tooth at a time.

In Fig. 1 an electromagnet D′, influenced by a local circuit, is shown; but instead of this a spring could also be used. By this means the shaft *x* is always rotated in the same direction by the currents which pass through one or other of the electromagnets D D′. The wheel *b*, which, as above described, is likewise rigidly mounted on the shaft *x*, has only the purpose of effecting a rigid connection or coupling between the shaft *x* and sleeve *s*. By this device the shaft *x* can thus be caused to rotate the wheels *c m n v* T, mounted on the sleeve *s*. The wheel *c* is provided laterally with a pin *y*, which when the sleeve *s* is pushed forward engages between two teeth of the wheel *b* or in corresponding holes near the circumference, and so effects the coupling.

The reciprocating motion of the sleeve *s* is effected by the lever *h*, pivotally mounted at *h′*, so as to move horizontally about its fulcrum. One end h^2 of this lever is forked, while the other end is provided with an armature lying between two small electromagnets E E′. The fork h^2 embraces the sleeve *s* and lies between the disks *m* and *n*. Thus according as the end h^2 presses against one or other of the disks *m* or *n*—*i. e.*, according as the magnet E′ or E is excited—the sleeve *s* is displaced and the shaft *x* and sleeve *s*

are coupled or uncoupled, respectively. Of the other two wheels v and T, rigidly mounted on the sleeve s, the wheel v is for the purpose of feeding forward the paper ribbon as the sleeve commences to turn. As shown in Fig. 6, it is provided with a depression or notch v', which only comes into action as the paper ribbon is to be fed forward. The wheel T is the so-called "printing-wheel" and effects the adjustment of the type-pieces by the intermittent movement of the escapement-wheel a.

The operation of the apparatus is as follows: The two electromagnets D D′ are in the same circuit, the one D′, however, in addition to the line-winding, is also wound by the wire of a local circuit. By means of these two electromagnets the shaft x is always rotated in the same direction. This is done on the one hand by the local current, which only operates at D′, and on the other hand by means of the line-current, which passes around both magnets D and D′ and only operates at D when it runs in the opposite direction to the local current. If now there is no line-current, only the local current operates—*i. e.*, the armature of the electromagnet D′ will actuate the escapement-wheel, and this action will continue until a line-current impulse arrives running in a direction opposite to that of the local current and attracting the armature of the electromagnet D. If, for instance, the direction in the local circuit is positive the armature of the electromagnet D′ will remain attracted so long as positive currents arrive. If, however, a negative current arrives the electromagnet D will operate.

From this arrangement it follows that, first, every line-current impulse does not operate the escapement-wheel a, but impulses of one kind—*i. e.*, either only positive or only negative currents—have such effect, and, second, the frequency of the oscillations of the escapement is much greater and more certain than in the case of an opposing effect exercised by a spring.

It is obvious from this arrangement that the revolution of the shaft x, and thus of the whole system of wheels, can only result from one kind of line-current impulses—*e. g.*, from positive-current impulses. If, on the contrary, a current impulse of another kind passes, the shaft x remains unmoved. This second kind, however, excites another electromagnet—viz., that one which effects the printing of the letters.

The coupling and uncoupling of the sleeve s with its wheel system is effected, as above mentioned, by the electromagnets E and E′. These electromagnets are excited by a small local current in such manner that either one or the other is in the circuit, Fig. 7.

The current which excites one or other of the electromagnets E E′ comes from the battery L′ B′, Fig. 7. The battery R S supplies the closed circuit for the electromagnet D′. The battery D^2 B^2 comes into action through the operation of the polarized relay p' r as often as the current impulse passes, which causes operation of the electromagnet O.

The line-current L, coming from the transmitting-station W, Fig. 7, through depression of a key of the board first passes through the electromagnets D′ D, then passes to the polarized relays p' r, and from here to earth. The arrows show the course of the current. From each pole of the local battery L′ B′ are two wires. The one, 1, encircles the electromagnet E and passes to the support k, Figs. 3 and 7, the construction of which is such that metallic contact between it and the part 5 can only take place at the top surface. It then passes farther through the part 5, when the latter presses against the top surface of k, through the part 6, and then farther through the wire 2 back to the other pole. As is to be seen, the continuation or closing of the circuit depends upon the part 5 making contact with the part k. (Compare Figs. 8, 9, 10, and 11.) The wire 3 passes around the electromagnet E′ and then to the support d. The current goes from here farther through the wheel c (when its nose or catch, compare Fig. 5, comes to rest on the part d) and through the wire 4 to the other pole. From this it is clear that the electromagnet E′ only then operates if the nose of the wheel c is in contact with the support d.

The nose on the wheel c is for the purpose of striking on the arresting-support d, Fig. 5, on the recoil of the system s c v T.

The surface of the support d is only metallic at the top at the place where the nose lies on it, Fig. 5. If then attraction—*i. e.*, coupling—takes place—that is, if the pin y of the disk c, mounted on the sleeve s, engages in the teeth of the wheel b, mounted on the shaft x—the disk c will be displaced and its nose comes to a non-metallic part of the surface of the support d.

At the moment when the nose makes contact the local circuit last referred to, containing a small electromagnet E′, is closed. The result is the engagement of the whole system with the wheels a b. When coupling takes place, the circuit is opened. If now the line-current impulses which operate on the escapement-wheel through the electromagnet D pass, the whole wheel system will turn in the direction of the arrow, Fig. 5, through the same number of teeth on the escapement-wheel as there are current impulses which have passed. In this manner, however, the letter which is to be printed comes opposite to the paper ribbon to be pressed against it. If the type is adjusted, it can only be printed when no more current impulses of the first kind pass but a current impulse passes in the opposite direction. By means of this impulse and only through such the electromagnet O operates, which effects the pressing up of the paper ribbon and which, as already mentioned, is influenced by a suitable polarized relay p' r, Fig. 7. If the letter is print-

ed thus and the armature of the electromagnet O brought back to the position of rest by the spring 10, the sleeve *s* and coöperating parts are immediately uncoupled and the normal position restored. The sleeve *s*, on which the wheels T *v m n c* are rigidly mounted, receives under the action of the spring *i*, Fig. 1, a rotation opposed to that of the escapement-wheel *a* and is finally stopped. From this it is obvious that on uncoupling the sleeve *s*, with its wheels, will recoil.

As already mentioned, the uncoupling is effected by means of the electromagnets E E'. Supposing now that the coupling has been effected, then by reason of the current impulses, which influence the electromagnet D, not only the escapement-wheel *a*, but also the sleeve *s* and coöperating parts and the printing-wheel T, will turn. The required letter will now be opposite the paper ribbon to be pressed up, which lies on the projection 6, Figs. 7 and 10.

Referring to Figs. 8, 9, 10, 11, and 12, the first shows a side view of the printing-wheel at the moment after being coupled. Figs. 9 and 10 are similar side views at the moment of printing, and Fig. 11 at the moment when the spring 10 acts—that is, when the armature is pulled down—and Fig. 12 at the moment of uncoupling again being effected. The arm *k*, carrying the rubber pin *k'* is resilient, so that it oscillates to and fro by the motion of the printing-wheel T. In the position shown in Fig. 8 the moment is characterized in which *k k'* is already bending back from the printing-wheel and remains in this position, being held by the part 5. If now, however, the part 5 is raised through the action of the electromagnet O, *k* and *k'* will spring back against the printing-wheel T, as shown in Figs. 9 and 10. If, therefore, after the printing the armature is drawn back and the part 5 drawn down the latter will come in contact with the surface of the arm *k*, Fig. 11. As already mentioned, however, the circuit of the current from the battery L' B', Fig. 7, containing the electromagnet E, will at this moment be closed. This electromagnet, therefore, will now act and draws upon its armature, whereby the uncoupling is effected. Through the uncoupling, however, the sleeve *s*, with coöperating parts, will slide along, whereby the rubber pin *k'* is pushed aside. The result of this is that in addition to the already-described recoil of the system *s v* T *c* through the action of the spring *i* the armature of the electromagnet O and the piece 5 laterally of the arm *k* are drawn farther downward. If, however, the part 5 has fallen from the surface of *k*, the current will be interrupted and the electromagnet E cut out. Immediately after the interruption at 5, however, another current from the same battery-circuit L' B', in which E' is included, passes through the contact of the nose-piece of the wheel *c*, Fig. 5, with the support *d*. Hereupon by the action of the electromagnet E' the coupling will again be effected and the position of the parts according to Fig. 8 restored.

The feed of the paper ribbon can advantageously be effected by a spring-pawl *p*, Fig. 6, being held against a ratchet-wheel *z* by means of a wheel *v*. The feed-wheel *v* is provided with a depression or notch *v'*, which is always in the position shown in Fig. 6 as soon and as often as the normal position of the sleeve *s*—*i. e.*, of the whole system—is taken up, so that if the system *s* T *v c* again commences to turn under the action of this depression and of the pawl the wheel *z* will be turned through a distance of some teeth.

The operations following upon one another and occupying, perhaps, half a minute to complete are as follows: The magnet E' in the circuit L' B' effects the coupling. In this moment the position is as in Fig. 8. The electromagnet D' is now influenced by the closed-circuit current R S and attracts the armature connected with the escapement-wheel *a*. The inrushing impulses of current—say positive—overcome at the electromagnet D the magnetic effect of D', reduced by the latter, feed the paper ribbon forward and adjust the letter. The minus current following causes attraction of the armature of the electromagnet O—*i. e.*, effects printing, &c. At this moment the part 5 stands over the part *k*, Figs. 9 and 10. The spring 10 now acts and the part 5 falls down upon the part *k*, whereupon the circuit in which E is is closed. The result is that uncoupling takes place, the pin *k'*, Fig. 12, is pushed aside, the part 5 falls by the side of *k*, the circuit is thereby broken, and the system *s* T *v c* springs back into the normal position, &c. Hereupon, however, the current of the battery L' B', in which E' is, now closes again and the coupling is again effected.

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

1. A printing-telegraph for transmitting messages over short distances comprising a keyboard-transmitter and a receiver consisting of a rotatable shaft *x*, a spring-actuated sleeve *s* sliding and rotating on said shaft, an escapement-wheel *a*, and a perforated coupling-wheel *b* mounted on said shaft, a coupling-wheel *c* having a nose mounted on said sleeve and engaging said wheel *b*, a printing-wheel T mounted on said sleeve and means for feeding a paper ribbon to same; in combination with an escapement *g* for said wheel *a*, electromagnets D D' operating said escapement, armature-lever *h*, electromagnets E E' operating one end of same, disks *m*, *n* on said sleeve engaging the other end of said lever, an electromagnet O, an armature device 5, 6 operated by same, a spring device *k k'* engaging said printing-wheel, and coöperating with said armature device, in conjunction with

batteries and relay p' v connected as described and illustrated, all operating in the manner substantially as set forth.

2. In a receiver for printing-telegraphs, the combination of a rotatable shaft x, a spring-actuated sleeve s sliding and rotating on said shaft, an escapement-wheel a and a perforated coupling-wheel b mounted on said shaft, and a printing-wheel T, disks m, n, o and coupling-wheel c having a nose and projection, mounted on said sleeve, and a stationary device d coöperating with said nose substantially as described.

3. In a printing-telegraph apparatus, two parallel electromagnets E E′ connected in a local-battery circuit and having a common lever-armature h h' h^2, in combination with the shaft x of a receiver, a coupling-disk b mounted on said shaft, a sleeve s sliding and rotating on said shaft and a printing-wheel T mounted on said sleeve, and disks m n on said sleeve engaging with the end of said armature, so that the sleeve may be moved in one or other direction, as one or other electromagnet operates, substantially as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

LUIGI CEREBOTANI.

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