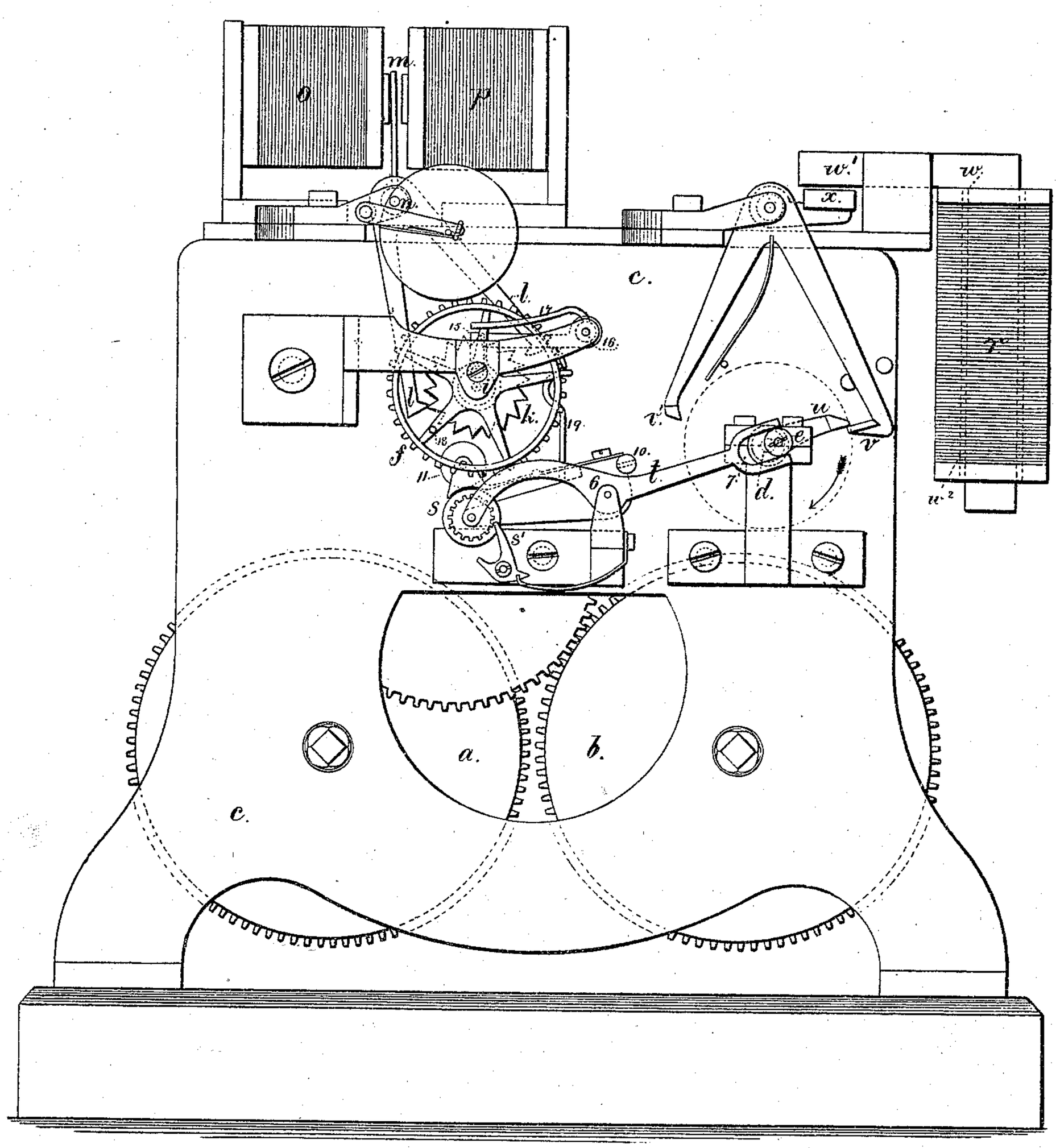
2 Sheets--Sheet 1.

G. M. PHELPS.

Printing-Telegraphs.

No. 144,285. Patented Nov. 4, 1873.

Fig. 1.



Witnesses

Chas H. Smith

Geo. D. Walker.

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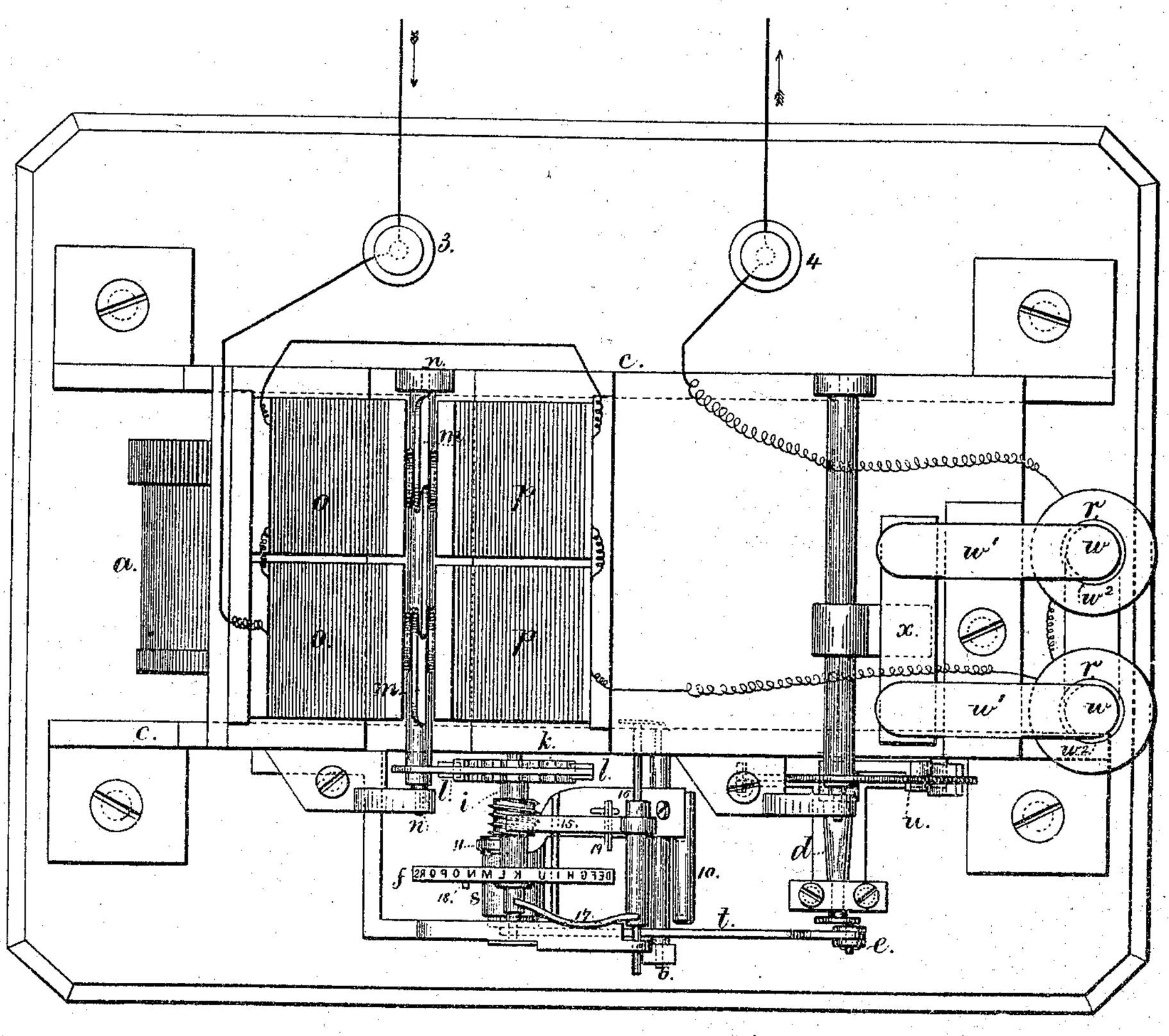
2 Sheets--Sheet 2.

G. M. PHELPS.

Printing-Telegraphs.

No. 144,285. Patented Nov. 4, 1873.

Fig. 2.



Witnesses
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UNITED STATES PATENT OFFICE.

GEORGE M. PHELPS, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN PRINTING-TELEGRAPHS.

Specification forming part of Letters Patent No. **144,285**, dated November 4, 1873; application filed April 8, 1873.

To all whom it may concern:

Be it known that I, GEORGE M. PHELPS, of Brooklyn, in the county of Kings and State of New York, have invented Improvement in Printing-Telegraphs, of which the following is a specification:

In this machine there are three electro-magnets, and the line-circuit passes through them all. The pulsations of electricity employed to set the type-wheel are alternated in polarity, and act upon an armature intervening between the poles of two of the magnets, to move the same first one way and then the other, and by wedge-acting pallets or escapements move or control the movement of the type-wheel. The reverse pulsations alternating rapidly do not allow sufficient energy to accumulate in the third magnet to move its armature until a slight pause occurs, and the magnetism becomes sufficient to move the armature and liberate the mechanism that prints, and then draws the paper away from the type-wheel.

By this device the printing is effected more reliably and rapidly than by the direct action of an armature-lever, because the mechanism that effects the printing is uniform in its action, instead of depending to a certain extent upon the power of the electric current acting in the electro-magnet, as heretofore, and the pressure-pad and paper are also drawn back from the type-wheel before the mechanism is stopped, so that the impression cannot be blurred by the movement of the type-wheel.

In the drawing, Figure 1 is a side view of this printing-telegraph instrument complete, and Fig. 2 is a plan of the same.

The two spring-barrels *a b* are mounted in frames *c*, and connected by suitable clock-work or trains of gearing, one with the shaft *d*, upon which is the crank-pin and roller *e*, and the other with the shaft *i* of the type-wheel *f*. Upon the shaft *i* is an escapement-wheel, *k*, and the pallets *l* and armature *m* swing upon the pivots *n*, and allow the spring and train of gearing to move the type-wheel around one letter or character at a time. The magnets *o p r* are in the main-line circuit connected to the binding-screws 3 and 4, and pulsations are sent over the line alternately of opposite polarity; hence the polarized armature *m* will be moved first one way and then the other, and great rapidity of movement can be obtained in setting the type-wheel through the agency of the escapement-wheel and train of gearing; or in cases where the spring *a* and train of gearing are dispensed with the pallets may be wedge acting, so as to rotate the type-wheel. If the pallets and pallet-wheel are of the character to form what is known as a recoil-escapement the pallets may be moved by the pallet-wheel and gearing after the line is free from electricity, and the type-wheel will be revolved by the train of gearing until arrested by the unison-stop, in which condition it will remain until the instrument is again operated. By this means the dead-"beat escapement" is dispensed with, the unison-stop arrests the movement of the clock-work, preventing the same running down and bringing all instruments in a line to unison on an open circuit, the clock-work aids the movement of the armature, and greater speed is attained with less battery power. The printing-roller *s* is upon a lever, *t*, that has a fulcrum at 6, and a slot, 7, for the crank-pin or crank-pin and roller *e*. Upon the shaft *d* is an arm, *u*, and *v v'* are the swinging pallets actuated by the armature *x* of the magnet *r*. These parts form a let-off mechanism for the shaft *d* and arm *u*. In the normal position the arm *u* and shaft *d* are arrested in their revolution by the pallet *v*, and at this point the crank-pin *e* is in such a position to the lever *t* that the impression-roller and strip of paper are away from the type-wheel; hence the same will revolve without inking the paper. As soon as a pause occurs in the alternate pulsations transmitted, so that the magnet *r* accumulates energy enough to attract the armature *x*, the pallet *v* releases the arm *u*, and the clock movement gives the same and the shaft *d* about one-half a revolution, and the arm is stopped against the pallet *v'*. In this movement the roller *s* has been moved up, and the paper impressed against the type, and the roller *s* carried down again sufficiently to free the paper from the type, because the crank-pin *e*, in its half-movement, has passed beyond its lowest point. The pulsations can now be repeated to set the type-wheel for the next letter, and as soon as the magnet *r* is sufficiently demagnetized the armature *x* recedes, releasing the arm *u* from the pallets *v'*, which arm makes about a half-revolu-

tion, and stops again against the pallets *v*. In this movement the impression-roller is carried away the greatest distance from the type-wheel and brought slightly back, and the paper is fed along by the pawl *s'*, giving the roller *s* a partial revolution. The strip of paper passes through a guide, 10, and beneath a yielding roller, 11, that presses it upon the roller *s*. In consequence of the joint action of mechanism and magnetism in effecting the printing, great rapidity and reliability are insured, and a comparatively weak electric current can be employed. The magnet *r* is made with the core *w*, that projects laterally as an arm, w^1, and the core is surrounded by a brass or other non-magnetic metallic tube, w^2; the object being to slightly detain the magnetism in the core, so that the magnet will not respond as rapidly as it would if the helix were shorter or the armature opposite the end of the core; and the brass tube w^2 also aids to detain the magnetism; the object being to prevent false printing when the transmitting-instrument is operated slowly.

The magnet *r* might be placed above the clock-movement, in line with the magnets *o* and *p*. In this case the lever will be nearly straight, to bring the armature vertically into position.

If desired, the magnets *o* and *p* might have lateral branches from their cores to operate upon an armature connected with the pallets *v v'*, and thereby dispense entirely with the magnet *r*; and in case one magnet, *p*, is used with an armature and retractile spring, then only one magnet may be used, and the pulsations will not require to be of opposite polarity.

The type-wheels of all the instruments in one circuit may be brought into unison by continuing the alternate pulsations until the screw on the type-wheel shaft, acting upon a tooth, 15, on a shaft, 16, has brought the stop 17 along into a position to arrest the pin 18, and stop the further movement of the type-wheel until a pause occurs that allows the printing-lever to operate, and by the stud 19 lifts the tooth 15 clear of the screw, so that a spring can return the parts to their normal positions.

It will be apparent that the action of the escapement-wheel, in allowing the type-wheel to rotate until stopped at the unison-point, will be the same, whether a spring, weight, or electric motor is applied to rotate the type-wheel shaft.

The clock-movement, tending to turn the type-wheel, is only controlled by the escapement and electro-magnet when the instrument is in operation; and when the electro-magnets are not energized the escapement may vibrate by the action of the clock-work, and if unrestrained the clock-work would run down when not in use; but by combining with this instrument a unison mechanism, then such unison performs the double duty of arresting the movement of the clock-work and of stopping the machines at the zero or unison; and, furthermore, the armature *x* might be employed to act directly upon the printing-lever, and move the same in cases where the magnets and circuits are arranged, as before described.

I claim as my invention—

1. In a printing-telegraph, a shaft, that by its revolution actuates the printing-lever and impression-pad, in combination with a let-off mechanism applied to that shaft, and an armature and electro-magnet that are energized by a pause with the circuit closed to hold the type-wheel in position while the printing takes place, substantially as set forth.

2. A printing-telegraph, in which the step-by-step movement of the type-wheel is regulated by two electro-magnets, and the printing is effected by a revolving mechanism, in combination with a third electro-magnet in the same metallic circuit that is rendered operative by a pause with a closed circuit and the let-off mechanism for the impression, substantially as set forth.

3. A type-wheel that is revolved by a spring or other motor, and a recoil-escapement connected with the armature of an electro-magnet, in combination with a unison-stop that arrests the rotation of the type-wheel only when the said type-wheel arrives at the correct unison position, substantially as set forth.

4. A magnet made with prolonged poles to retard the accumulation of magnetic energy, in combination with the printing-lever and the armature for moving or controlling the movement thereof, substantially as set forth.

5. A magnet with a non-magnetic metallic tube surrounding the core, in combination with the printing mechanism, for the purposes and as set forth.

Signed by me this 1st day of April, A. D. 1873.

GEO. M. PHELPS.

Witnesses:
GEO. T. PINCKNEY,
CHAS. H. SMITH.