WILLIAM B. GUERNSEY.

Improvement in Printing-Telegraphs.

No. 126,290. Patented April 30, 1872.

Fig. 1.

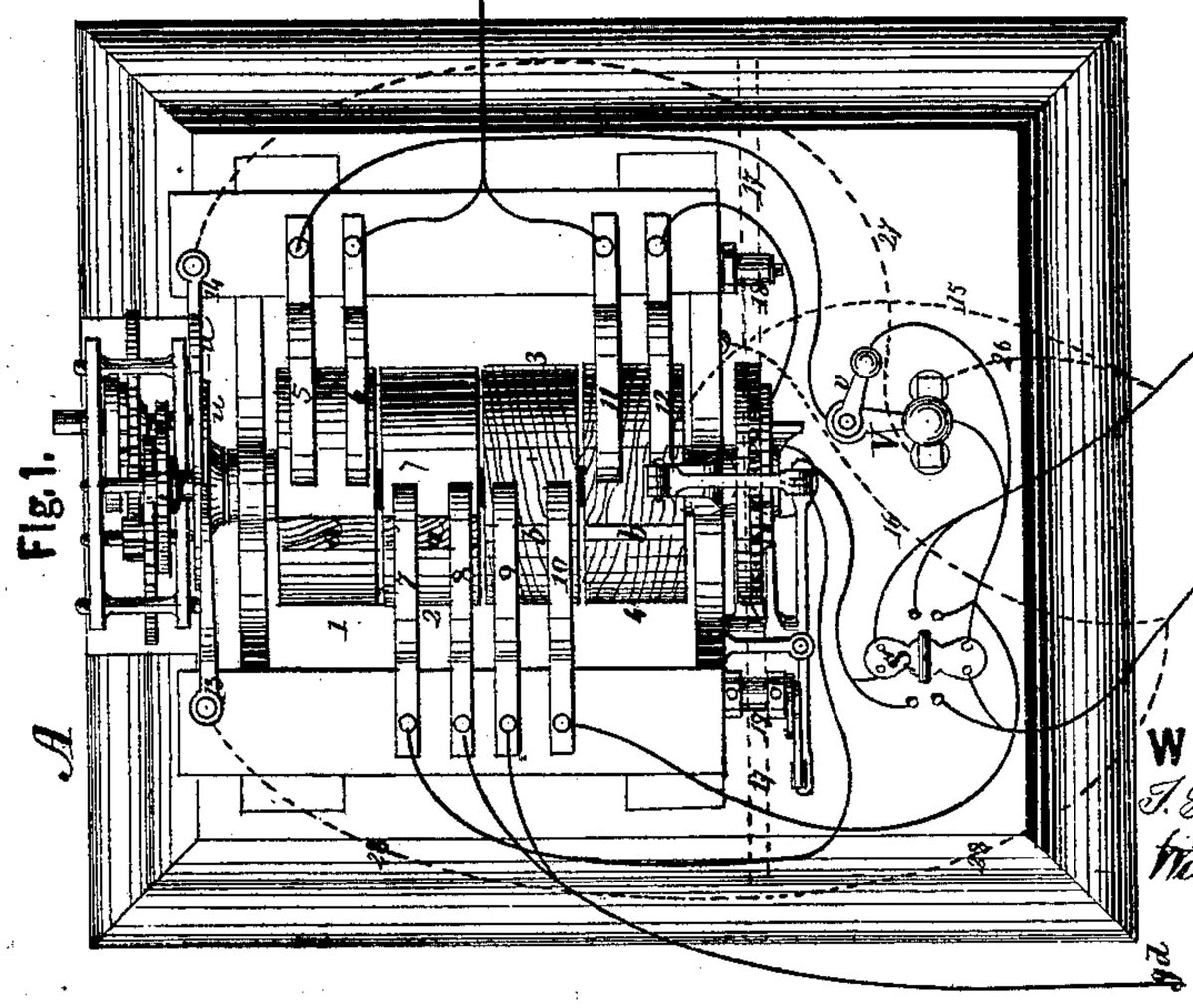

Fig. 2.

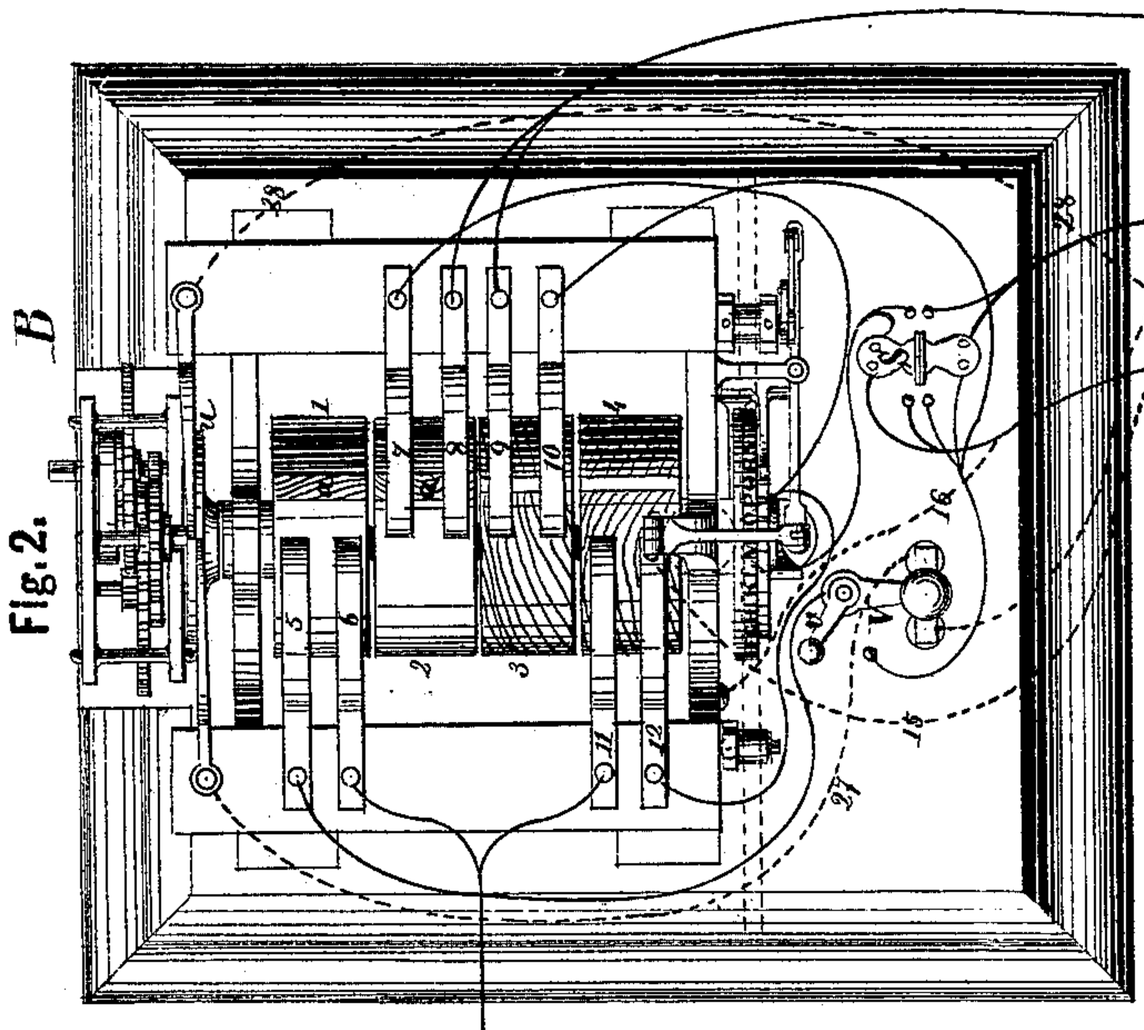

Fig. 3.

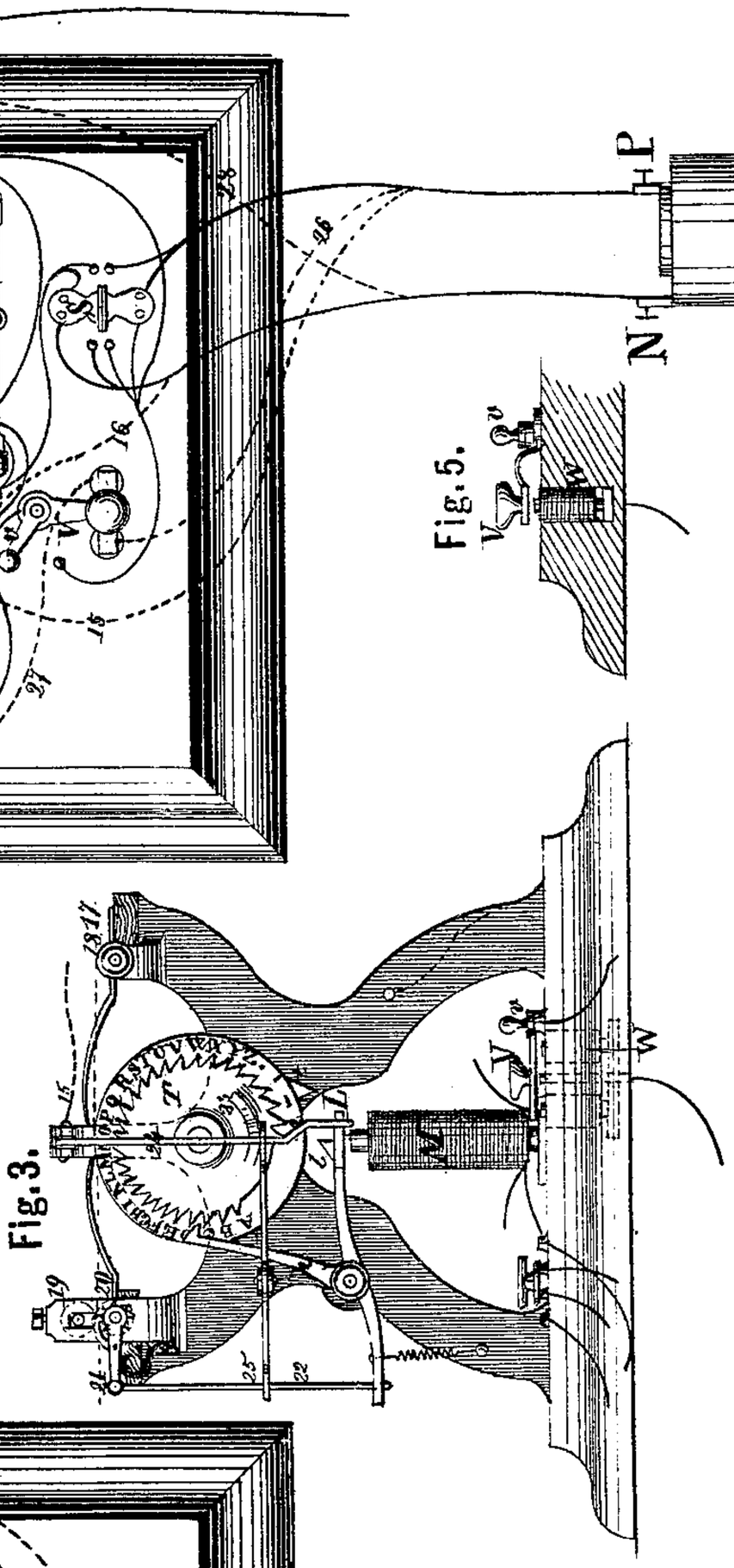

Fig. 4.

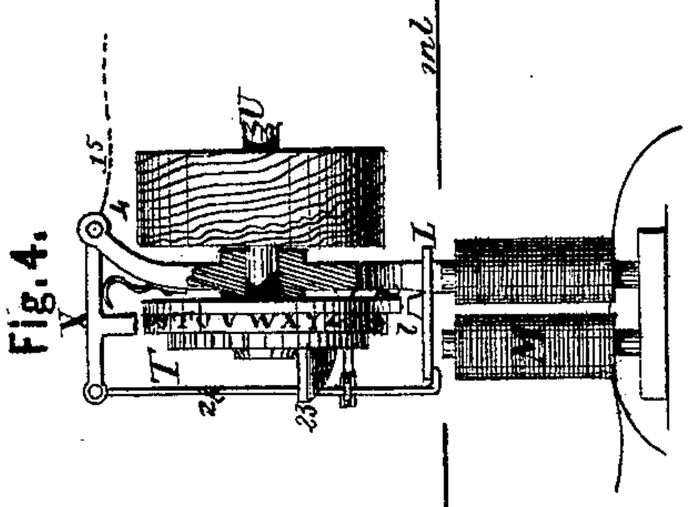

Fig. 5.

WITNESSES.

J. Schreitlin

Walter Allen

INVENTOR.

Wm. B. Guernsey

By Knight Bros

Attorneys

126,290

UNITED STATES PATENT OFFICE.

WILLIAM B. GUERNSEY, OF JERSEY CITY, NEW JERSEY.

IMPROVEMENT IN TELEGRAPHS.

Specification forming part of Letters Patent No. 126,290, dated April 30, 1872.

Specification of an Improved Electric Telegraph, invented by WILLIAM B. GUERNSEY, of Jersey City, in the county of Hudson, New Jersey.

As shown in diagrams, this is a visual and chemical printing-telegraph; but it can be adapted for a mechanical printing-telegraph as well. It is represented as designed for use between two offices or stations only. Each instrument is propelled by clock-work, made to run so near synchronously as to allow of one full revolution of the type-wheels without error greater than one of its subdivisions, (teeth.) The further synchronism is insured by the action of the "unison stop" described further on. The main or line battery is equally divided between the two stations, and serves when required for a "local," also. When the line is not in use the two sections of the battery are left with their similar poles turned toward each other, thus preventing action. The pole-changing switches S enable either operator to effect this, as also to bring opposite poles into the same direction whenever the line is to be used. The type-wheel T is affixed to a shaft, U, which has also affixed to it four wheels or drums, 1 2 3 4, serving, in connection with the series of springs shown, as contact-breakers and pole-changers; and a fifth wheel or drum, *u*, acting as contact-maker in connection with the key, as described further on. 1 and 2 have complete metallic surfaces, except the narrow non-conducting strips *a a*. 3 and 4 have non-conducting surfaces, except the narrow metal strips *b b*. These strips are in line with each other end, and the bearing-surfaces of the springs are all in line with each other, or are so arranged that *a* and *a* shall break contact before and after *b* and *b* shall have made it. Attached to the type-wheel T, and moving with it, is another wheel, (in reality constituting a part of type-wheel, and it will be so spoken of in this description.) The periphery of this supplemental wheel is divided into teeth or cogs, a few of them being cut away, leaving a space constituting an arc equal to *a a*. The number of teeth left is to equal the number of letters or characters which are to be transmitted. The type-wheel carries, also, upon a wheel laterally affixed to it, as the cog-wheel is, and upon the opposite side, a projection or tooth, *t*, which engages at each revolution with a projection, *l*, from the armature L of the magnet M, (the said magnet being always open upon the arrival of such projection.) The position of the two projections is such that they will engage or come in contact at the precise moment that contact between the springs 9 10 and 11 12 is made by *b b*. A hooked lever, *h*, rigidly attached to the armature aforesaid, will, whenever the said magnet is closed, engage with one of the teeth of the cog-wheel T, except that the position of the smooth part of the periphery is such that while, and so long as contact between the springs 5 6 and 7 8 is broken by *a a*, the hooked lever *h* would impinge upon such smooth portion instead of engaging with a tooth, as aforesaid. The noticeable effects of this arrangement are, first, so long as the main or line circuit is "on," (*i. e.*, when the pole-changing switches are so turned as to bring the two sections of the battery into co-operating action,) but open, (at the key of one of the instruments,) the type-wheels T will revolve, and that with a synchronism perfected at one point in each revolution, for whichever projection *t* of the type-wheels first reaches the point of engagement with the armature projection *l* is thereby caught and retained until the similar projection of the other type-wheel also makes contact with its armature; for, if one type-wheel be at "unison" (point of engagement) and the other not, no circuit can be had through the line, and so the magnet must remain open and the leading type-wheel be delayed; but when both type-wheels have arrived at "unison" there will be established a circuit in a contrary direction to the "line-circuit," which contrary circuit I call the "unison-circuit." The passage of the current through this circuit will, of course, close both magnets, and so release both type-wheels, to be again, each by its own clock-work, propelled another revolution. Second, the closing of the magnet, which releases the type-wheel when at "unison," will stop it if happening at any other point of its revolution. This is effected by the action of the hooked lever *h* upon the teeth of the type-wheel T, so that if the line-circuit be closed by depression of the key at any time when the wheels are revolving and are not at "unison," they will both be stopped so as to indicate the same letter or character, and will remain stopped until the circuit is again broken at the key.

Figures 1 and 2 are plans of telegraph instruments, supposed to be at different ends of the line. Fig. 3 is an elevation of one of said instruments. Fig. 4 is a section on the line *x*, Fig. 1. Fig. 5 is a section at *y*, Fig. 3, showing my improved key in side elevation. g^d represents the ground-wire; *m l*, the line-wire.

A B represent clock-movements, which may be used to rotate the shaft U and perform the local mechanical operations, such as propeller of the paper if the apparatus be employed to print. I show, at V, a key which I have devised for the transmission of signals, to be used with this or any other power-propelled type-wheel telegraph. The switch *v* is the same as used in the "Morse" key for breaking the line-circuit while "writing." The key itself is used somewhat as the Morse key is, and resembles it, except that it bears upon its under surface the armature of a small electro-magnet, W. When the line is "on," and the type-wheel consequently revolving, contact-springs 13 14 upon the drum *u* make and break a local circuit through the magnet W at the passage of each letter. If not held open the key (with the line "on" and one key-switch is "off") will act automatically, stopping the type-wheel at every character. If held, it will communicate to the hand a slight impulse or tremor at the passage of each letter, and the operator is not only aided by this addition of the sense of touch to eye and ear, but, in reality, has nothing to do but to let go of the key just after the passage of the impulse imparted by the character next preceding the one he desires to indicate, and the key will descend of itself, make the contact requisite to produce the signal, and return to his hand, leaving the type-wheel free, as before. The speed with which writing can be done is very much increased by the use of this key; but the Morse key, or any arrangement for completing the circuit at will, can be used with this telegraph.

The diagrams show plainly the directions of the currents, main and local, as affected by the automatic key. The line-currents are represented by full lines and the local by dotted lines.

In this telegraph the line-battery has nothing to do but to stop type-wheel and to propel the paper, if used. The rotation and the printing, if mechanical, are done by local power, clock-work, for example. As a local each section of battery has only to actuate the automatic key, if used, and to effect the chemical printing of the characters. It will be noticed that at each stoppage of the type-wheels for whatever purpose exact synchronism will be restored if there be at the time no error greater than the length of a tooth or letter. In the chemical printing-telegraph shown there are two local circuits at each instrument. One, leading from the positive pole (or it may be from either pole) of the section battery, by wire 26 and 27, passes through the helices of the key-magnet V and terminates in or passes through the contact-spring 14 upon drum *u*, the other contact-spring 13 being connected to the other pole of the battery by wire 28. Another circuit is formed through the type-wheel T by a connection, 15, from the positive pole of the battery to the iron lever X, (which is insulated from the type-wheel frame,) and by another connection, 16, from the frame of the type-wheel to other pole of battery.

The devices shown for printing are as follows: Upon the periphery of the type-wheel T, which, as well as its frame, is of metal, are formed, in metal, outlines of the several letters and characters required. A strip of chemically-prepared paper, shown at 17, lies along horizontally above said letters, resting upon them. When printing is to be done the metallic lever X (which is insulated from the frame) is by the action of the armature-lever L and hooked rod 24 brought down upon the top of the paper, thereby closing a local circuit from the positive pole of the battery-section through wire 15, iron platen X, chemically-prepared paper 17, type-wheel T, type-wheel frame, and wire 16, to the negative pole of the battery. The paper is supported by roller 19 and held between rollers 19 and 20. A ratch and lever movement, 21, serves to rotate 20, propelling the paper a distance sufficient for one space or character at each movement. The swinging hooked lever 22 is pulled downward by each upward movement of armature L, thereby imparting such desired movement to said roller and paper. At what may be called the unison stop-point in each revolution the cam 23 pushes out the lower end of the hooked rod 24, and this, by the agency of the connecting-lever 25, retracts the hooked rod 22, so that the armature-lever L cannot affect either, and therefore at such point the magnet may close without propelling the paper or actuating the platen.

From the foregoing description it will be seen that the downward movement of the armature L, except at "unison," effects the printing, while its upward movement, except also at "unison," moves the paper, making it ready for the next impression. The form of the letters on face or periphery of type-wheel must be such as to facilitate the passage of the current and the forming thereby upon the chemically-prepared paper of a distinct outline or surface-letter or character.

The addition of an inking-roller upon the face of the frame in such position that its periphery will work in contact with the edge of the type wheel will convert the apparatus from a chemical-printing into a mechanical-printing-telegraph.

If the error in clocks can be kept less at each revolution than the value of one tooth or (in the present illustration) one thirty-third of the circumference of the type-wheel, any number of machines can be worked in the same circuit. The apparatus will constitute an excellent "gold and stock printer."

While describing this invention as primarily

intended for telegraphic purposes, I propose to use its principal parts, with slight modifications, for the purposes of protective alarms, the battery being disposed in two connected sections, one at the point to be guarded and the other at the instrument. The line-wires are so connected to the pole-changing springs that, excepting at the unison point where the armatures are drawn down to release the wheels, the two sections of battery will balance each other, causing no current in the main wires; but if the line be short-circuited, cutting out one battery, the battery at the instrument will be rendered active, instantaneously throwing the detent-lever L against the toothed wheel E; or, if the main line be broken, the motion of the wheel will be arrested at "unison" and there held. In either case the stoppage of the wheel can, by the action of a loose fly-wheel, such as described in another application of mine of even date herewith, or by any suitable contrivance, be made to start either a magnetic or a mechanical alarm.

The invention above described also admits of the employment of a system of irregular pulsations, as explained in my other application, to which reference is made.

Claims.

I claim as new and of my invention—

1. An automatic unison stop, arranged to operate substantially as herein set forth.

2. Unison stops, controlled by automatic-pole changers, substantially as herein set forth.

3. The toothed wheel T, having an interdental space and a detent, *t*, and employed in combination with the detent-lever L and magnet M, substantially as and for the purposes set forth.

4. The circuit-breaking or reversing cylinders 1 2 3 4, constructed to operate substantially as set forth.

5. The printing apparatus, consisting of a type-wheel, a platen, an electro-magnetic circuit, and the mechanical connections for actuating the platen and the paper-feeding devices, substantially as herein described.

6. The key V, actuated by a magnet, W, substantially as and for the purposes described.

7. A two-station printing or visual telegraph, with balanced batteries and independent-power driven instruments automatically brought to unison at each revolution of their type-wheels, and so constructed as to actuate the signaling and unison apparatus by means of a single magnet at each instrument.

W. B. GUERNSEY.

Witnesses:
OCTAVIUS KNIGHT,
WALTER ALLEN.