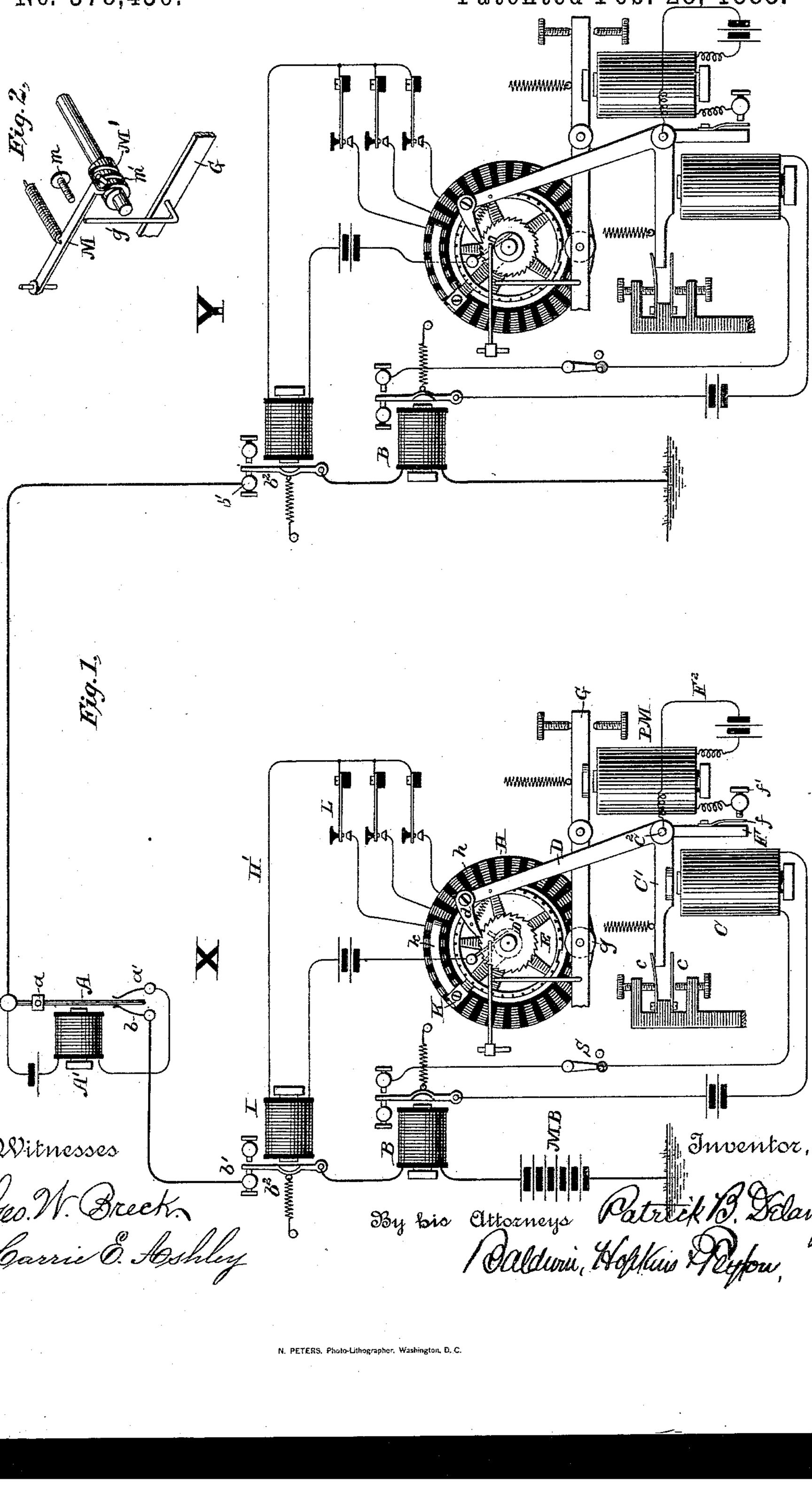
(No Model.) 2 Sheets—Sheet 1.

P. B. DELANY.

PRINTING TELEGRAPHY.

No. 378,436. Patented Feb. 28, 1888.



Witnesses

Geo. W. Breck.

Carrie E. Ashley

Inventor,

Patrick B. Delany.

By his Attorneys

Baldwin, Hopkins & Peyton,

(No Model.) 2 Sheets—Sheet 2.

P. B. DELANY.

PRINTING TELEGRAPHY.

No. 378,436. Patented Feb. 28, 1888.

Fig. 5,

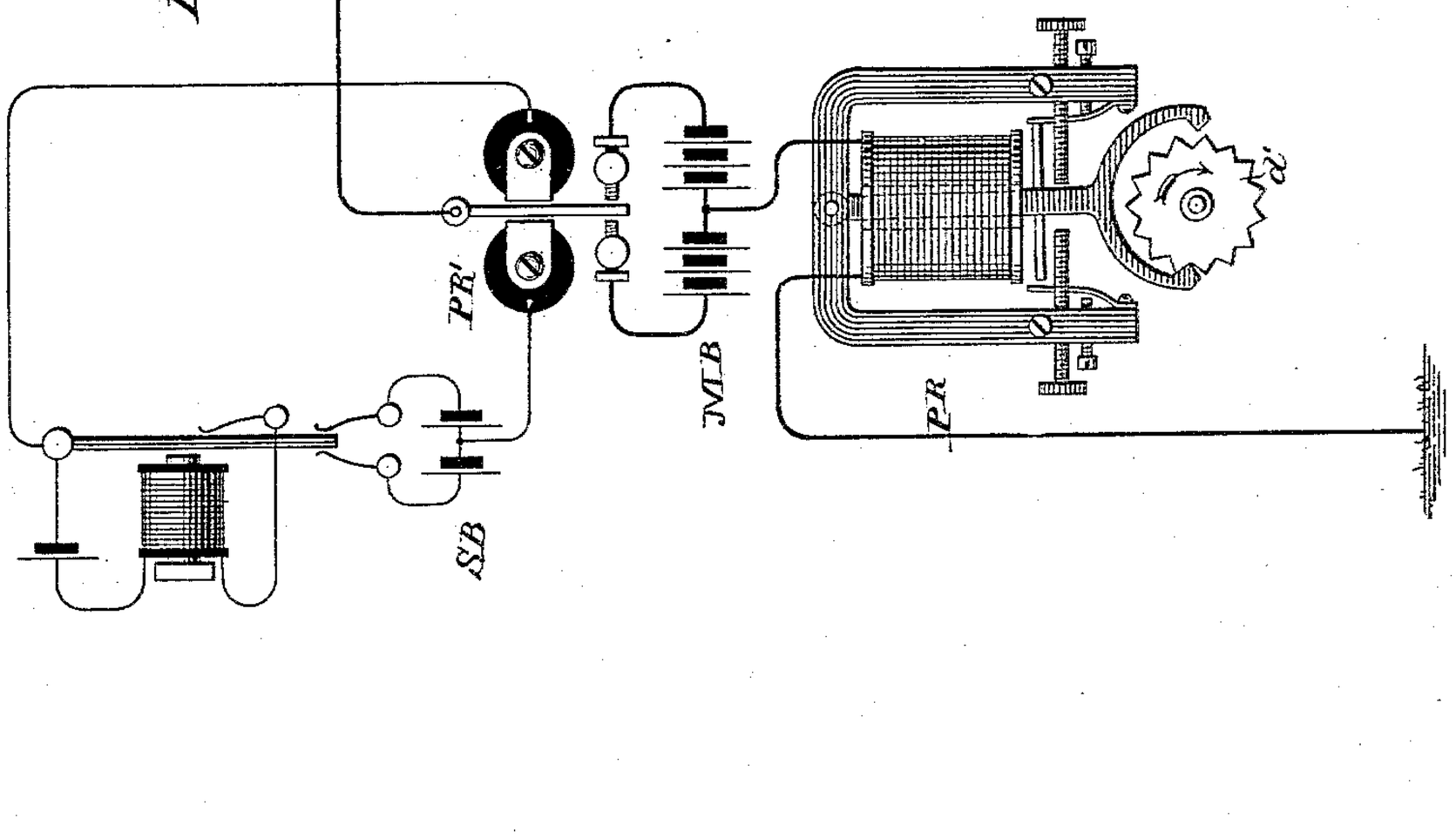


Fig. 3,

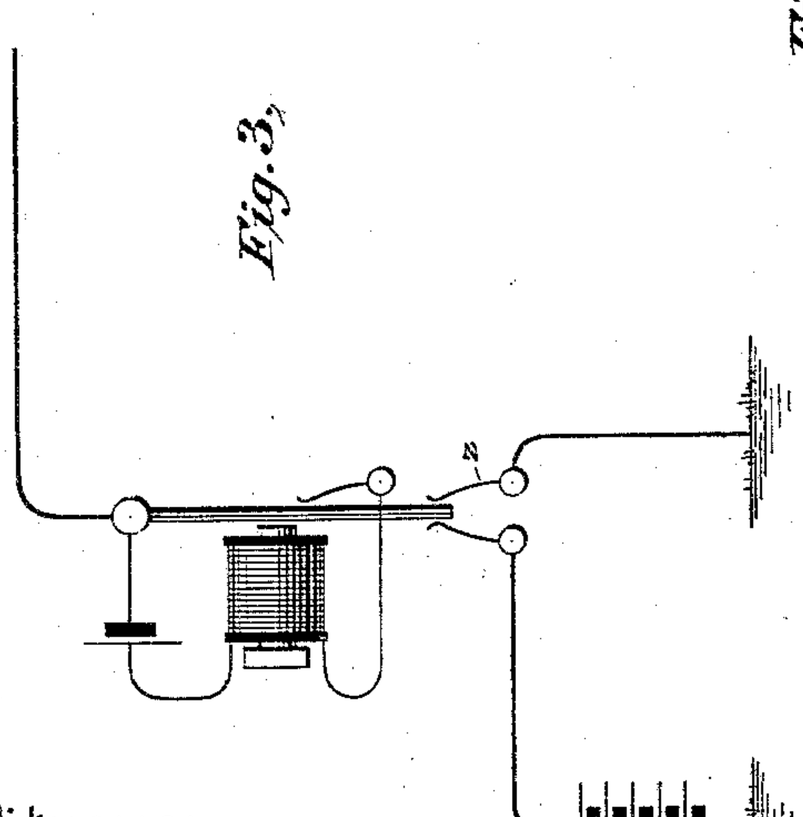
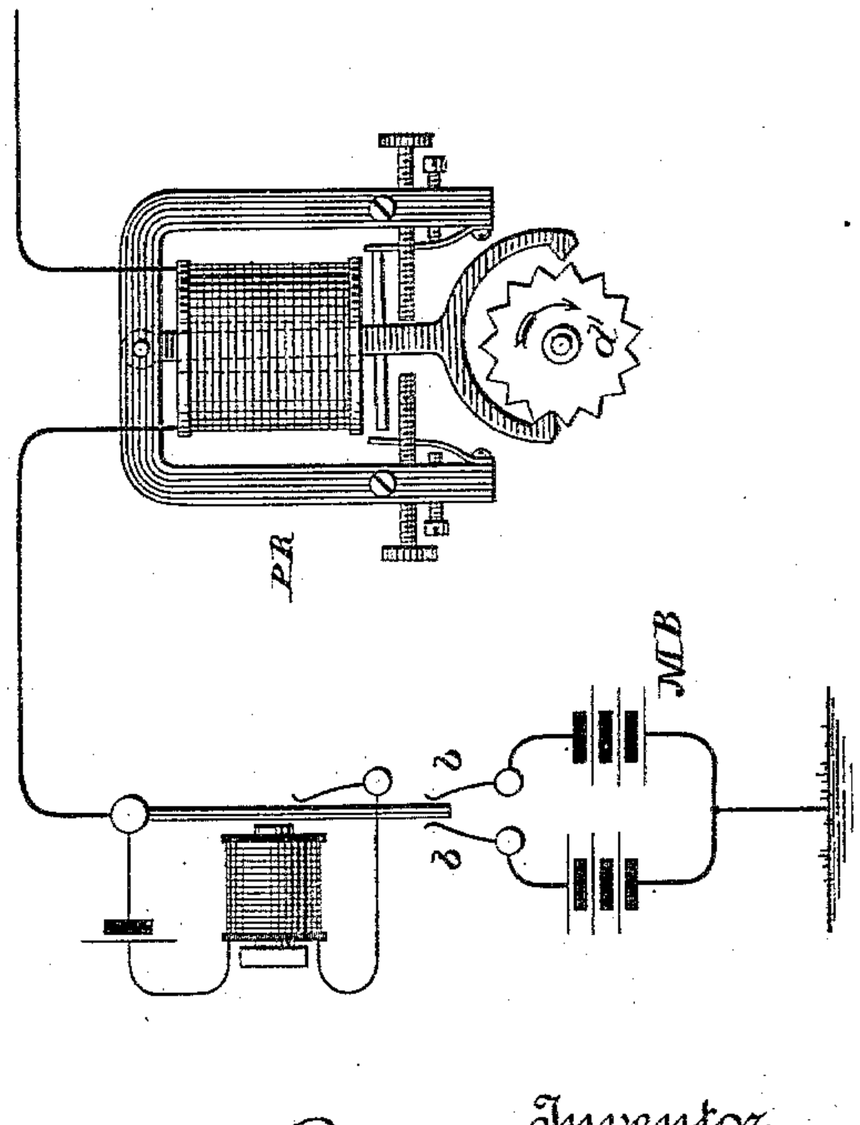


Fig. 4,



Witnesses

Geo. W. Breck.

Carrie E. Ashley.

Inventor.

Patrick B. Delany.

By his Attorneys

Baldwin, Hopkins & Peyton.

N. PETERS, Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

PATRICK B. DELANY, OF NEW YORK, N. Y.

PRINTING-TELEGRAPHY.

SPECIFICATION forming part of Letters Patent No. 378,436, dated February 28, 1888.

Application filed December 13, 1886. Serial No. 221,432. (No model.)

To all whom it may concern:

Be it known that I, PATRICK B. DELANY, of New York city, State of New York, have invented certain new and useful Improvements in Printing-Telegraphy, of which the following is a specification.

My invention relates specially to a new system of printing or step-by-step telegraphy, in which the line is normally charged by continuously-intermittent impulses of electricity derived from a source independent of any of the instruments connected upon the line.

The general object of the invention is to provide a simple efficient system by means of which any of the operators at the several instruments on the line may communicate with each other or with all of the others, as may be desired. The system is specially useful in transmitting press reports or stock quotations, as well as for purposes of ordinary telegraphic communication by means of printers.

Without attempting at this time to specify the novel features of the invention, and without limiting myself to the particular organization and specific details so far as certain novel features are concerned, I will describe one way of carrying out my invention in a suitable and practicable manner.

In the accompanying drawings, Figure 1 is a diagram view illustrating two printing-stations arranged upon a main line in accordance with my invention; Fig. 2, a detail view of a suitable unison device of a well-known type, which may be employed on the printers; Fig. 3, a detail view illustrating an arrangement by which the main line may be grounded to eliminate static or other disturbing currents from the line after each impulse from the battery is sent into it; Fig. 4, another view illustrating the use of reverse currents and polarized electro-magnetic apparatus, and Fig. 5 a view of another arrangement for the same purpose.

Referring first to Figs. 1 and 2, I will describe the general organization and operation when working with a direct-battery current. At any suitable point in the main line, and preferably near one terminal of the line, is located an automatic circuit-interrupter, which may be a vibrating reed, fork, or other suitable apparatus, many forms of which are common and well-known in the art.

In the drawings I have indicated a vibrating reed, A, mounted at one end in a support, and provided with a sliding block, *a*, for regulating the normal rate of vibration. The reed is actuated by an electro-magnet, A′, included in a local-battery circuit, one terminal of which is connected with the fixed end of the reed and the other with a light elastic contact-finger, *a′*, with which the reed makes contact as it vibrates. An impulse of vibration having been imparted to the reed, it will thereafter continue to vibrate at a definite rate. Another contact-finger, *b*, is also arranged in suitable proximity to the reed, so as to be struck by it at each vibration. Any usual arrangement or device to prevent sparking may be adopted. The finger *b* forms part of the main line, which runs from the finger to the back-stop *b′*, against which the armature-lever b^2 is normally drawn by its retracting-spring. From the pivot of this armature the main-line circuit is continued through an electro-magnet, B, to one pole of a main battery, MB, the opposite pole of which is grounded. The main-battery circuit may be traced in the opposite direction from the vibrator A by the line ML, which is connected with the heel or support of the vibrator and runs to the next printing-instrument, where it is connected with another back-stop, *b′*, armature b^2, and magnet B to earth.

Two stations, X and Y, are illustrated. Obviously the main line might run in the same manner through any required number of instruments. Each time that the reed vibrates the main battery will be put to line and the magnet B at each printer energized.

The effect produced by the action of the magnet B is as follows: On the charging of the magnet B its armature is attracted from its back-stop, thus opening a local-battery circuit, B′, in which the coils of a step-by-step or actuating magnet, C, are included. On the breaking of the circuit B′ the magnet C releases its armature-lever C′, which is retracted by its spring, thus throwing the pawl *d* on the end of the push-lever D out of engagement with the actuating ratchet-wheel D′. When the impulse of electricity in the magnet B ceases, the armature returns to its back-stop, thus closing the local-battery circuit B′ and causing the magnet C to attract its armature C′ and throw the pawl *d* into engagement with the ratchet-wheel D′ and advance the type-wheel E one step. This action of course occurs at all the printers on the line, which will therefore be

rotated in unison step by step. It will be noted that the action of all the printers is dependent upon the action of the vibrator, which controls a single main battery from which all the instruments are actuated, there being no local main-line batteries at any of the stations.

The end of the armature-lever C′ of the type-wheel magnet C is shown as vibrating between two elastic plates or springs, *c c*, which are carried upon a suitable frame, and may be adjusted by ordinary thumb-screws, as illustrated. These springs are of such tension and are of course so adjusted as not to interfere with the step-by-step actuation of the type-wheel just described. They serve to render the instrument very noiseless, as the strokes of the armature-lever C′ are received upon the springs.

The same rock-shaft, C^2, which carries the armature-lever C′ and the push-lever D also carries a downwardly-projecting arm, F, on the face of which is secured an elastic contact-finger, *f*, adapted to work against an adjustable contact-stop, *f″*, forming one terminal of a local-battery circuit, F^2, in which the coils of the print-magnet PM are included. The other terminal of this circuit is connected with the rock-shaft or pivot C^2. The adjustment is such that as long as the impulses of electricity sent into the line from the main battery through the medium of the automatic vibrator occur regularly contact will not be made between the finger *f* and the adjustable stop *f″*, and the print-magnet will therefore not be energized. There are various ways of accomplishing such a result. One very familiar way is the interposition of a magnet and local circuit; but I prefer the arrangement shown. Should the effect of one such impulse, however, be eliminated, there would be time for the completion of the print-magnet circuit at the contacts *f f″*, and the print-magnet would attract its armature G, thus throwing the impression wheel or pad *g*, over which the paper traverses, against the type-wheel E, as is well understood. This operation is accomplished in the following manner: Concentric with the type-wheel shaft is arranged a sunflower-disk, H, the contacts *h* of which are connected through ordinary printing-keys with a local-battery circuit, H′, which includes the coils of a magnet, I. The other terminal of the circuit H′ is electrically connected, as shown, with the hub of a revolving arm, K, fast on the type-wheel shaft, and carrying a trailing finger, *k*, which traverses the contacts in the sunflower, as is well understood. If any one of the keys L be depressed when the trailer *k* is upon the sunflower-contact of that particular key, the local-battery circuit H′ will be completed, and the magnet I will attract the armature b^2, which, as before described, forms a part of the main line. The armature will therefore leave its back-stop, and one of the impulses which would pass into the main line from the main battery MB through the medium of the vibrator A will be prevented from doing so. As before mentioned, the print-magnet circuit F^2 will therefore be completed, the magnet energized, and its armature-lever G attracted, so as to take an impression from the type-wheel.

It will be noted that the spaces between the segments on the sunflower are about equal in width to the segments, and that when the type-wheel magnet is energized and the lever drawn down the trailing finger is so adjusted that it rests not on a segment, but on a space. Therefore, for each impulse or each movement of the type-wheel lever, the trailer is moved across the face of a segment. Now, if the key connected to a segment be depressed, the relay I is energized while the trailing finger is passing over the segment, and by the attraction of its armature the main battery is disconnected from the line, and the armature of the magnet B allowed to remain against its back-stop during the time of an impulse, thus allowing the lever C′ to remain down sufficiently long to close the circuit of the print-magnet firmly at *f f′* and effect the printing of a letter. During this short interval the type-wheel and trailer are arrested for an instant; but there is no delay in reaching the next letter to be printed. The circuit H′, being completed as the trailer crosses a segment and broken when the trailer rests on a space, obviously, if all the keys were held down, the apparatus would be rotated step by step and a letter printed at each step. If desired, by increasing the play of the relay B, two main-line-battery impulses might be eliminated and more time thereby given for the printing. This action of the sunflower and printing devices I consider novel. I have shown the segments separated a proper distance by insulating material, and when the trailer pauses on such a dead-space there is of course no current through the trailer; but the invention contemplates in its broadest sense, the general operation of printing after the trailer has crossed a key-segment and paused, irrespective of the character or use to which the spaces between the key-segments may be put.

A suitable form of unison device which may be employed in connection with my invention is illustrated in detail in Fig. 2, and is also seen in the illustration of the instruments in Fig. 1. It is of a common well-known type and need be but briefly described. A lug on a hinged arm, M, which is normally drawn toward a limiting-stop, *m*, by a suitable spring, runs in a worm, M′, on the type-wheel shaft. Whenever the print-lever is thrown up against the type-wheel, a pin, *g′*, thereon throws the arm M out of engagement with the worm, and it is immediately thrown back by the spring to its initial position against the stop *m*. Should the print-lever not be actuated for a given interval of time, then a pin, *m′*, on the worm will come against the end of the lever M and lock the apparatus. This pin is so placed that when the zero or unison position on the type-wheel is reached—say after the type-wheel has made three revolutions—the arm M en-

counters the pin and the type-wheel is arrested. The driving-lever cannot therefore push itself down between the ratchet-teeth of the wheel D′ more than about half-way, and not sufficiently far to carry the trailing finger *k* off of the segment connected to the zero-key. Consequently, when that key is pressed down the main-line impulses are discontinued through the medium of the relay B, and the type-wheel lever becoming perfectly still the print-magnet is actuated and the unison-lever thrown off.

Of course whatever occurs at one printing-instrument occurs at all, and the instruments will therefore be maintained in unison and operated together.

Messages may be transmitted from any one instrument to all of the others, and in practice each instrument will have a given call or number by which the operator there may be called up and receive special communications.

In the circuit B′ of each printer a switch, S, may be placed, so that that particular instrument may be cut out from the circuit; but of course the armature of the magnet B will continue to respond to the impulses on the main line, so that the operator may readily be called up at any time. If desired, any suitable sounder or calling apparatus—such as a bell or other signaling device—might be operated by the movement of this armature.

As I have before remarked, I do not limit my invention in its general aspect to the details of construction, and I do not therefore care to refer to the particular parts and suggest modifications; but, so far as the elastic stops *c c*, which work in connection with the armature C′, are concerned, I desire to state that one of the stops—for instance, the lower one—might be omitted, and the operation would still be very satisfactory and comparatively noiseless. I prefer, however, to use both stops, and to make them adjustable in substantially the manner illustrated in the drawings.

Wherever the current in the main line is rapidly broken there is a generation of static and extra currents which create more or less disturbance in the line, and it is therefore desirable to ground the line at each break to eliminate such disturbing effects from it. An arrangement for this purpose is shown in Fig. 3, which is a mere diagram stripped of any elements of the printers, and shows how the main line is discharged to earth from the reed at each vibration by means of a light contact-finger, *z*.

In Fig. 4 I have illustrated an arrangement by which alternating currents may be thrown upon the line. The arrangement of the reed, its local-battery circuit, and magnet is the same as before described. The main battery, however, is divided and grounded at the middle, and there is an elastic contact-finger, *b*, on each side of the reed, which throws first one pole of the battery and then the other to line. With such an arrangement as this the magnets B and C may be dispensed with and the type-wheel worked by a polarized relay, PR, as clearly seen in the drawings. The operation of such polarized relay is of course well understood and any description of it here is unnecessary. In this figure *d′* represents a star-wheel on the type-wheel shaft. An analogous arrangement is exhibited in Fig. 5; but here, instead of working the main-line battery MB directly by the reed, the reed is caused to throw reverse currents from a split battery, SB, in a local circuit through the coils of a polarized relay, PR′, with the armature of which the main line is connected. The armature vibrates between two stops, forming the terminals of the main battery MB, which is divided in the middle and shown as grounded through the coil of a polarized relay, PR, which actuates the type-wheel shaft of a printing-instrument.

So far as Figs. 4 and 5 are concerned, the operation and organization of the printers will be substantially that illustrated in Fig. 1, with the exception of such modifications as are necessary on account of the use of reverse currents; but operating by reverse currents being common and well known in printing-telegraphy, it has been deemed unnecessary to further describe or illustrate the organization.

I claim as my invention—

1. The combination, substantially as set forth, with a main line, a source of electric energy, and a constantly-acting current-pulsator by which intermittent electrical impulses are constantly thrown upon the line from said source, of printing-telegraph instruments of a class which transmit by eliminating one or more of said impulses from the line and receive by responding to such eliminations of current, and have their actuating relays or magnets connected directly in the line, whereby the printers move in unison step by step as their actuating-magnets are magnetized by the impulses traversing the line, and any one printer may transmit to the others at pleasure.

2. The combination, substantially as set forth, of a main line, a source of electric energy, a constantly-acting current-pulsator entirely independent of any of the instruments and located at any suitable point in the line by which impulses of electricity are constantly thrown upon the line from said source, and printing-telegraph instruments of a class which transmit by eliminating one or more of said impulses from the line and receive by responding to such eliminations of current, and have their actuating relays or magnets connected directly in the line, whereby the printers move in unison step by step as their actuating-magnets are magnetized by the impulses traversing the line, and any one printer may transmit to the others at pleasure.

3. The combination, substantially as set forth, of a main line, a source of electric energy, a constantly-acting pulsator consisting of an electrically-actuated automatic vibrator or reed located at any suitable point in the

circuit, by which impulses of electricity are constantly thrown upon the line from said source, and printing-telegraph instruments of a class which transmit by eliminating one or more of said impulses from the line and receive by responding to such eliminations of current, and have their actuating relays or magnets connected directly in the line, whereby the printers move in unison step by step as their actuating-magnets are magnetized by the impulses traversing the line, and any one printer may transmit to the others at pleasure.

4. The combination, with a main-line and printing-telegraph instruments which operate step by step in response to electrical impulses sent over the line, of a source of electric energy and an electrically-actuated automatic vibrator or reed by which impulses of electricity are thrown upon the line from said source.

5. The combination of the actuating-magnet of a printing-telegraph instrument, its armature-lever and push-arm, and elastic or spring limiting stop or stops against which it works.

6. The combination of a magnet, C, its vibrating armature, the limiting spring stop or stops against which it vibrates, another magnet, PM, its local circuit, and the contacts of said circuit which are operated by the vibrating armature.

7. The combination of the continuously-acting circuit-interrupter, the main battery, the type-wheel shaft, wheel, and sunflower, electro-magnetic devices for rotating the shaft by the action of the vibratory impulses of electricity sent into the line through the medium of the circuit-interrupter, the print devices, magnet, and circuit, the keys of the sunflower segments and their local circuits, the magnet I in said local key-circuits, and its armature in the line, substantially as set forth.

8. The combination of a sunflower having its key-segments placed so that the distance between them is substantially equal to the width of the segments, the circuits and keys of the segments, the type-wheel, means for actuating the type-wheel step by step and thereby causing the trailer at each movement to cross a key-segment and pause between it and the next key-segment, and printing devices which take impressions from the type-wheel during such pauses.

9. The combination of the sunflower having its segments separated by intervening spaces of suitable width, the sunflower-trailer, the segment circuit and keys, the type-wheel, means for actuating the type-wheel step by step and thereby causing the trailer at each movement to cross a key-segment and pause on the adjoining space, and printing devices which are thrown into operation by the passage of the trailer across a segment and take an impression from the type-wheel when the trailer and wheel have paused.

10. The combination of the sunflower having its segments separated by intervening insulated spaces of suitable width, the sunflower-trailer, the segment circuit and keys, the type-wheel, means for actuating the type-wheel step by step and thereby causing the trailer at each movement to cross a key-segment and pause on the adjoining insulated space, and printing devices which are thrown into operation by the passage of the trailer across a segment and take an impression from the type-wheel when the trailer and wheel have paused.

11. In a printing-telegraph, the combination of the sunflower, its segments, and segment circuits and keys, the type-wheel shaft and its actuating-star, a ratchet-wheel, step-by-step actuating devices for actuating said wheel, the sunflower-trailer rotated step by step by the type-wheel shaft and moved across a segment at each step, a unison device and its stop mechanism which checks the apparatus with the trailer on the zero-segment of the sunflower, and the print-lever which throws off the unison-stop on the depression of the zero or starting key of the sunflower.

12. In a printing-telegraph system, the combination of an automatic circuit-interrupter or impulse-sender and contacts against which it works, one contact for effecting its automatic actuation, one for connecting the main line with a main battery, and one for connecting the line to earth, substantially as and for the purpose set forth.

13. The combination of a main line, a printing-instrument, the sunflower and its trailer, the segments of the sunflower separated by intervening spaces upon which the trailer pauses when at rest, and the circuits and keys of said segments, the type-wheel and printing devices, step-by-step actuating devices whereby the type-wheel is actuated and the trailer at each step moved across a key-segment and checked between it and the next key-segment, and printing devices which upon the depression of the keys take impressions from the type-wheel during such momentary pauses.

14. The combination, with a source of electricity and a line, of step-by-step actuating mechanism connected in the line, whereby a printer is actuated step by step in correspondence with pulsations or intermittent impulses of electricity sent over the line, the type-wheel, sunflower and keys, and key-circuits of said printer, a magnet in the key-circuits which momentarily opens the line when a key is depressed and its circuit completed, thereby eliminating one or more of said actuating impulses from the line and causing a momentary pause of the type-wheel, and a print-lever actuated to take impressions from the type-wheel during such momentary pauses without interrupting the further step-by-step movement of the wheel, substantially as set forth.

In testimony whereof I have hereunto subscribed my name.

PATRICK B. DELANY.

Witnesses:

GEORGE A. SCOTT,

B. ROI.

Correction in Letters Patent No. 378,436.

It is hereby certified that in Letters Patent No. 378,436, granted February 28, 1888, upon the application of Patrick B. Delany, of New York, N. Y., for an improvement in "Printing-Telegraphy," an error appears in the printed specification requiring correction, as follows: In line 81, page 4, the comma after the compound word "actuating-star" should be stricken out and the letter "a" following it should read *or;* and that the Letters Patent should be read with this correction therein to make it conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 6th day of March, A. D. 1888.

[SEAL.]

D. L. HAWKINS.
Assistant Secretary of the Interior.

Countersigned:
BENTON J. HALL,
Commissioner of Patents.