

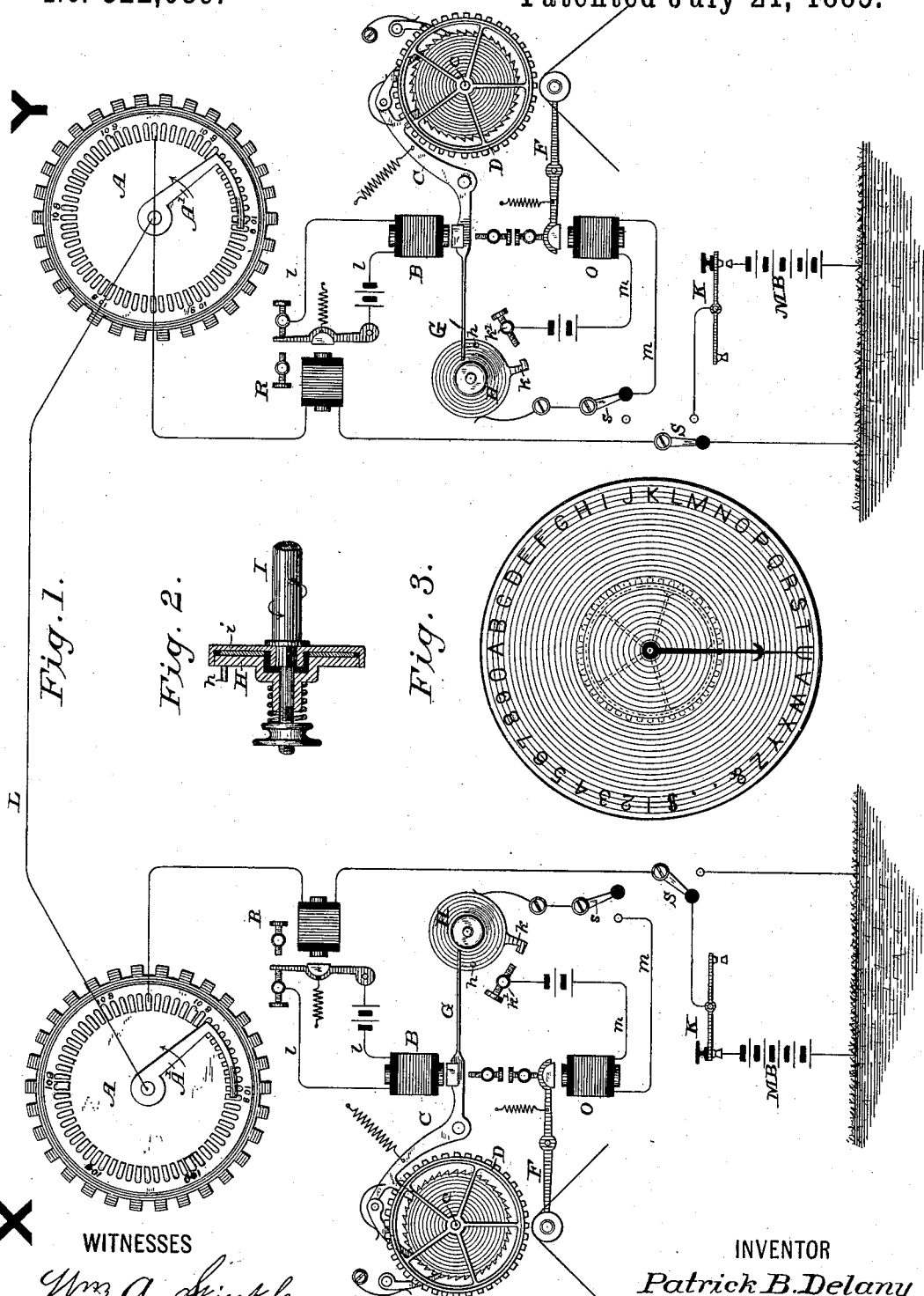
(No Model.)

P. B. DELANY.

PRINTING DEVICE FOR SYNCHRONOUS TELEGRAPHY.

No. 322,689.

Patented July 21, 1885.



WITNESSES

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PATRICK B. DELANY, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE STANDARD MULTIPLEX TELEGRAPH COMPANY, OF SAME PLACE.

PRINTING DEVICE FOR SYNCHRONOUS TELEGRAPHY.

SPECIFICATION forming part of Letters Patent No. 322,689, dated July 21, 1885.

Application filed October 24, 1883. (No model.)

To all whom it may concern:

Be it known that I, PATRICK B. DELANY, a citizen of the United States, and a resident of the city, county, and State of New York, have
5 invented certain new and useful Improvements in Telegraphy, of which the following is a specification.

My invention involves the use of a synchronously-moving apparatus at each of the
10 telegraphic stations; and it consists in a novel and useful organization of printing, registering, dial, or other indicating-instruments in connection with such synchronous movements.

In sundry Letters Patent of the United
15 States granted October 9, 1883, and numbered 286,273, 286,274, 286,275, 286,276, and 286,277, I have shown and claimed certain improvements in synchronously-actuated apparatus. I prefer to use the system illustrated in those
20 patents, as I consider it absolutely accurate and reliable in its movements. My invention, however, is not confined to the special synchronous apparatus illustrated in those patents, nor to any particular apparatus, though
25 I deem that shown in the patents mentioned best.

In the accompanying drawings I have indicated diagrammatically the arrangement of contacts, both for correcting and for other
30 purposes, shown in my Patent No. 286,274.

It is deemed unnecessary to elaborate the drawings or to describe in detail the construction and operation of the apparatus shown in that patent, as these points are fully described
35 and copiously illustrated in the patent referred to, to which reference is made for a full exposition of the matter.

In the accompanying drawings, Figure 1 is a diagrammatic view of two connected stations organized according to my invention; Fig. 2, a detail sectional view of the device for controlling the local circuit of the print-lever; and Fig. 3, a detail view of the indicating-dial, showing the type-wheel in dotted
45 lines.

In the synchronous apparatus illustrated in the drawings a circular table, A, of contacts is shown, over which a trailing finger or circuit-completer, A', permanently connected
50 with the main line, traverses.

Sixty contacts are shown arranged on each of the table of contacts; though obviously a greater or less number may be employed, if desired, within certain limits. The contacts on each table are numbered in six independent series from 1 to 10. The 9's and 10's are
55 devoted to the correction of the electrically-connected synchronous apparatus, as fully set forth in the patent last mentioned. This leaves forty-eight contacts which may be used
60 for the transmission of messages.

It is obvious that when the trailing fingers at each station are moving synchronously and rest upon corresponding contacts at each of the stations there will be momentarily a complete and independent circuit from the contact at one station to the contact at the other, and such an independent circuit is passed successively to the remaining pairs of corresponding contacts.
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If a printing, dial, registering, or indicating telegraphic apparatus be connected with each of the working-contacts at both stations with suitable batteries and transmitting-keys, it will be obvious that as the synchronous
75 apparatus rotates the corresponding instruments at each end of the line will successively be placed in communication. If the apparatus rotates, say, three times a second, each independent circuit will be completed three times
80 in each revolution. These impulses or completions of the circuit are utilized to actuate the receiving apparatus in transmitting from one station to another. If such apparatus is of the ordinary step-by-step character, or of
85 such a character as to be manipulated by such successive completions of the circuit to print, register, or indicate on a dial the letter or word transmitted, it is obvious that messages may be transmitted as accurately between each pair
90 of corresponding instruments as if a line were devoted exclusively to their use. Thus, with a table of sixty contacts arranged as illustrated and connected by a single main line, forty-eight private and independent circuits be-
95 tween the two stations are obtained. As above remarked, this number may be increased within limits.

The transmitting and receiving apparatus at each station is preferably of the simplest
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character, so that skilled operators may be dispensed with and the apparatus worked by inexperienced persons. Such apparatus, either dial instruments or alphabetical printers, are well known, and have been successfully used in large city exchanges. With simple apparatus of this character circuits such as described may be rented out on what is known as the "private-wire system."

In Fig. 1 a main line, L, is shown as connecting two synchronous apparatus, A A. A separate line is to extend from each of the working-contacts 1 to 8 in each series to a relay, R. Of course, as each corresponding pair of instruments are separate and distinct, it will be sufficient to illustrate, as is done in Fig. 1, the organization of apparatus connected with one contact only at each station. From the relay R the line may be connected with a battery, M B, through a key, K, or put to ground by a switch, S, as is usual. The armature of the relay R works against front and back stops, and the terminals of a local circuit, *l*, are connected, respectively, with the back stop and armature. This circuit includes an electro-magnet, B, which actuates a pivoted push-lever, C, which acts on a toothed wheel on the shaft *c*, which carries the type-wheel D.

With the switch S at station X put over so as to include the key and battery in the circuit, and the line put to ground at station Y, the operation is as follows: The key K at station X is normally open when the line is not being used. A pointer on the end of the shaft *c* of the printing apparatus traverses a dial bearing the letters of the alphabet or such other signs as are to be transmitted. The pointers at both stations rest normally upon the zero-point, which just precedes the letter A. If the key K at station X now be depressed as shown, the impulses transmitted over the main line to the relay R at station Y open and close the normally-closed local circuit *l* and vibrate the lever C, thus causing the dial-pointer and type-wheel to rotate. The same operation occurs at the transmitting-station also. When the finger on the dial therefore reaches the letter or sign which is to be indicated at station Y, the operator at X opens the circuit and the pointer and type-wheel at station Y pause, thus indicating the letter transmitted. The circuit is again closed and the apparatus rotated into a position to indicate the next signal or letter, and so on.

If it is desired to print as well as indicate the signals on the dial, a strip of paper is fed between the type-wheel and the pivoted printing-lever F in the usual way. An arm, G, extends from the rocking push-lever C partly across the face of a disk, H. This disk is carried upon the spindle I of a clock-work. It is loosely mounted thereon, but is in frictional contact with a disk, *i*, fast on the shaft. The amount of the friction may be regulated by a thumb-nut and spring on the end of the shaft.

A pin, *h*, projects from the face of the disk into the path of the end of the arm G. The friction-disk H also carries a contact-finger, *k*, which is arranged in such close proximity to another contact, *k'*, that a comparatively small movement of the disk H is required in order to bring the contact *k* against the contact *k'* and complete a local circuit, *m*, the terminals of which are respectively connected with the disk or contact *k* and the contact *k'*. This local circuit includes the coils of a magnet, O, which operates to throw the printing-lever up against the type-wheel and print the desired letter or character.

The operation of the printing-lever is effected in the following manner: The pin *h* on the disk H is in such relation to the end of the arm G that when the key K at the transmitting-station is kept closed and the magnet B is energized with comparative rapidity (three times, more or less, a second) to rotate the type-wheel the pin *h* is constantly snubbed back by the end of the arm G as it moves back and forth, so that the disk H is never permitted to rotate a sufficient distance to bring the contacts *k* and *k'* together; but when the key K at the transmitting-station is opened to indicate or signal a particular character at the receiving-station one or more of the periodic impulses are prevented from entering the line, and the vibrating lever C, and the arm G carried thereby, remain at rest for a longer period, and as the local circuit *l* is completed the magnet B keeps the lever C drawn down so as to elevate or move the end of the arm G away from the pin *h*. This permits the lazy device or tardy circuit-completer H *i* to complete the print-magnet local *m*, the disk H being carried around by frictional contact until the contacts *k* and *k'* come together, when the strip of paper is thrown up against the type by the printing-lever. When the key at the transmitting-station is closed again, the step-by-step rotation of the apparatus is continued, and the pin *h* is again snubbed by the end of the arm G, so as to open the local circuit *m* between the contacts *k* and *k'*.

The printing apparatus described is well adapted for the purpose; but my invention of course is not limited to this identical apparatus, or to any particular apparatus. Of course a dial merely without any printing attachments at all could be used, and in the organization illustrated, when it is desired to omit the printing, the local circuit *m* may be opened by a switch, *s*, at either or both of the stations. The speed of such apparatus will, under most circumstances, be found sufficient for the use of the "private-line" parties. If, however, a greater speed should be desired on any particular private line, the instruments on that line at each station might be connected with two or more of the contacts at regular intervals on the table.

A step-by-step or printing instrument such as I have described can be worked by impulses

occurring at comparatively long intervals—say, one impulse for each revolution of the apparatus—and the operator, by holding his key closed, may cause the receiving apparatus at the distant station to travel step by step to the letter or signal, which he may print by releasing the key. The circuit is therefore capable of a much greater subdivision than under the Morse system of transmission, in which the impulses for each circuit must be so rapid as to give a practically continuous current.

It will be perceived that such a system as I have described gives an enormous capacity to a single main-line wire.

Under my improved system a record of all messages transmitted and received may be preserved by the parties. A further advantage is that no spoken words are necessary, and the messages transmitted between the parties can be absolutely secret. Further than this, under my system of transmission it is absolutely impossible for a line between the parties at any point to be tapped; nor is it possible for the parties on the other circuits to receive any message transmitted over one of the circuits. With such a system of operation the cost of private lines to the subscribers may be reduced to a very small figure.

My system contemplates the establishment of exchanges in cities connected by one or more main-line wires under my system, so that the private-line subscribers in one city may communicate with either of the private-line subscribers in the other city.

Such an organization as last mentioned is not claimed or illustrated herein, but is reserved for other applications to be filed by me.

No claim is made herein to the method of operation consisting in operating the instruments step by step by regular impulses of electricity and then causing the receiver to print the required character by increasing the time elapsing between two of said impulses, and thus prolonging the period when there is no current on the line, as such subject-matter is claimed in a division of this case filed August 21, 1884, No. 141,134.

I claim as my invention—

1. The combination, substantially as set forth, of a main line, synchronously-actuated apparatus at each end of the main line, a table of independent working-contacts connected with the synchronous apparatus at each station, and a step-by-step printing, dial, registering, or indicating apparatus connected in an independent line with one or more corresponding contacts at each station.

2. The combination, substantially as set forth, of a main line, synchronously-actuated apparatus at each end of the main line, a table of independent working-contacts connected with the synchronous apparatus at each station, a transmitting key or apparatus, and a battery connected in circuit with a contact or contacts at one station, and a step-by-step

printing, dial, registering, or indicating apparatus connected in circuit with the corresponding contact or contacts at the other station.

3. The combination, substantially as set forth, of a main line, synchronous apparatus at each end of said line, a series of independent working-contacts at each synchronous apparatus, a number of independent private circuits common to the main line which are successively completed between the corresponding contacts at the two stations, and transmitting devices, and step-by-step printing or indicating instruments included in said independent circuits.

4. The combination, substantially as set forth, of a main line, synchronously-actuated apparatus at each end of the main line, a series of insulated contacts connected with the synchronous apparatus at each station, mechanism for successively placing the main line in electrical connection with each of said contacts, one or more step-by-step printing, dial, or indicating apparatus connected with one or more of the corresponding contacts at each station, and other of said contacts through which correcting impulses of electricity may be sent from one station to the other to insure the synchronous rotation of the two apparatus.

5. The combination, substantially as set forth, of a main line, synchronously actuated apparatus at each end of the main line, a table of insulated contacts connected with the synchronous apparatus at each station, contacts placed at intervals around the table of contacts at each station through which correcting impulses of electricity may be sent from one station to the other to maintain a synchronous rotation of the two apparatus, transmitting apparatus, and a step-by-step printing, dial, or indicating apparatus connected with one or more of the corresponding contacts at each station, and mechanism for successively placing the corresponding contacts at each station in electrical communication with the main line.

6. The combination, substantially as set forth, of a main line, a table of independent contacts at each end of the main line, synchronously-actuated circuit-completing fingers which traverse said contacts, a main battery, a receiving-instrument connected with one or more contacts at one end of the main line, said receiving-instrument consisting of the combination of signaling or printing devices, mechanism, circuits, and connections by which it is advanced or rotated step by step by periodic impulses of electricity received over the main line, and a lazy device or tardy circuit-completer which prevents the actuation of the printing or signaling devices as long as said impulses are regularly received, but permits the printing or signaling of a character when one or more of said impulses are prevented from passing over the line, and a transmitting device connected with the cor-

responding contacts at the other end of the main line, said transmitting device consisting of the combination of mechanism, as described, for sending periodic impulses into the line, transmitting devices for preventing one or more of said impulses from entering the line when a given character or signal is to be indicated or printed, and mechanism, circuits, and connections whereby the printing or signaling devices of the transmitting-instrument are actuated step by step and maintained in the same relation to the printing or signaling devices at the receiving-station.

7. The combination, substantially as set forth, of the main line, the relay which is actuated by periodic impulses of electricity transmitted over the main line, the actuating-magnet, a local circuit in which it is included, which circuit is made and broken by said relay when said impulses are received over the line, the printing-magnet, and the lazy device or tardy circuit-completer for completing said circuit when a more than normal period of time has elapsed between said impulses.

8. The combination, substantially as set forth, of a main line, a table of independent contacts at each end of the main line, synchronously-actuated circuit-completing fingers which traverse said contacts, a main battery, a step-by-step instrument substantially such as described and operating as set forth, a relay at each station interposed between the table of contacts and said instrument, and the circuit and connections of said

relay, whereby an impulse of electricity transmitted over the main line is rendered effective upon the instruments when the relay-armature leaves its back stop.

9. The combination, substantially as set forth, of the step-by-step mechanism of a printing-telegraph or receiving-instrument, an electric circuit over which periodic impulses of electricity are sent to advance said step-by-step mechanism, the printing-magnet, its circuit, a tardy circuit-completer consisting of devices which complete said printing-magnet circuit when there is a prolonged absence of current on the line, and devices actuated by said received periodic impulses which prevent the circuit-completer from completing the printing-magnet circuit as long as such impulses are regularly received.

10. The combination, substantially as set forth, of the driven disk *i*, the loose disk *H*, held in frictional contact with the disk *i*, the stud *h* on the disk *H*, the vibrating lever *G*, the local circuit in which the disk *H* is included, and the contacts of said circuit, one of which is carried on or operated by the disk *H*.

In testimony whereof I have hereunto subscribed my name this 20th day of October, A. D. 1883.

PATRICK B. DELANY.

Witnesses:

FRANK W. JONES,
EDWD. A. CALAHAN.