(No Model.) 2 Sheets—Sheet 1.

E. J. MALLETT.

AUTOMATIC PRINTING TELEGRAPH.

No. 343,042. Patented June 1, 1886.

Fig. 1.

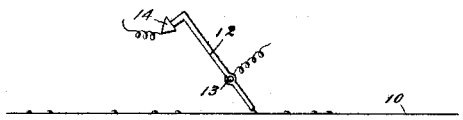


Fig. 2.

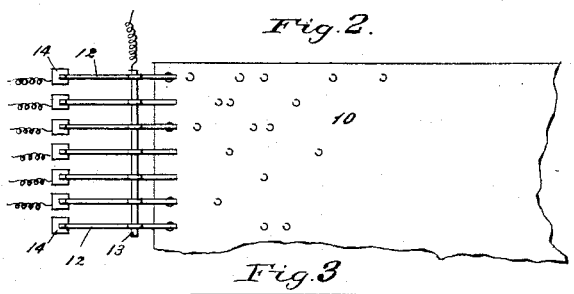
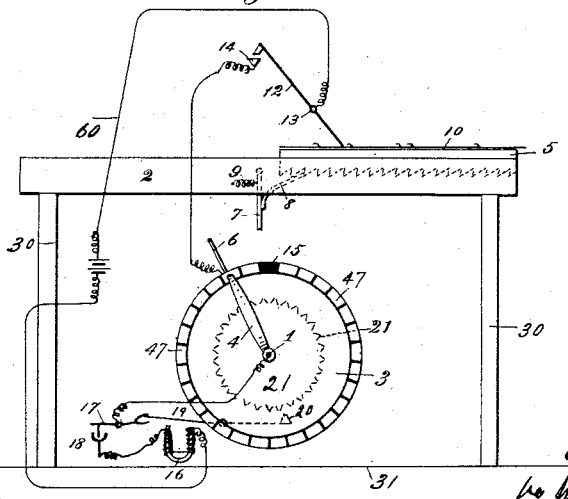


Fig. 3



Witnesses:
H. N. Low
J. H. Blandford

Inventor:
Edward J. Mallett
by Marcellus Bailey
his attorney

(No Model.) 2 Sheets—Sheet 2.

E. J. MALLETT.

AUTOMATIC PRINTING TELEGRAPH.

No. 343,042. Patented June 1, 1886.

Fig. 4.

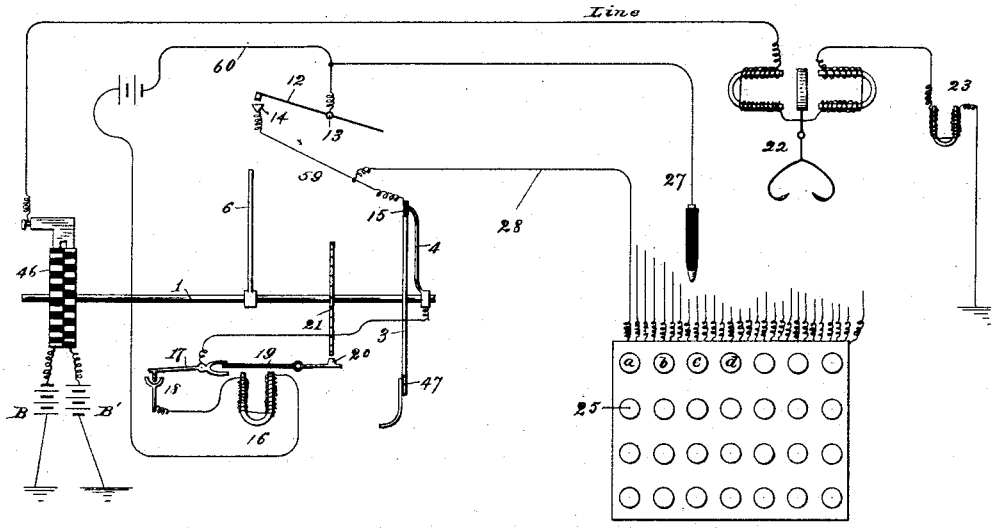
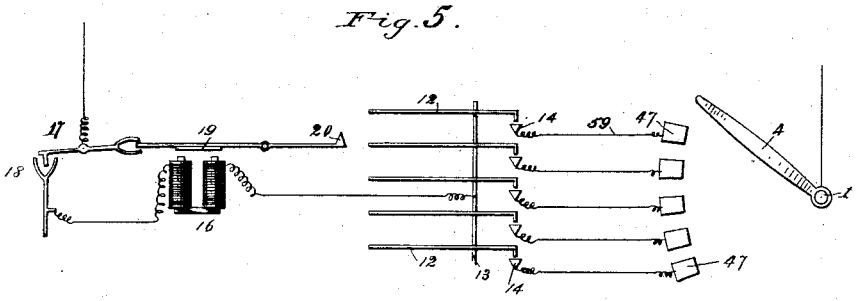


Fig. 5.



Witnesses:
H. N. Low
J. Malbone Blandford

Inventor:
Edward J. Mallett
by Marcellus Bailey
his attorney

UNITED STATES PATENT OFFICE.

EDWARD J. MALLETT, OF BAY SIDE, LONG ISLAND, NEW YORK.

AUTOMATIC PRINTING-TELEGRAPH.

SPECIFICATION forming part of Letters Patent No. 343,042, dated June 1, 1886.

Application filed February 7, 1885. Renewed April 30, 1886. Serial No. 200,737. (No model.)

To all whom it may concern:

Be it known that I, EDWARD J. MALLETT, of Bay Side, Long Island, in the State of New York, have invented certain new and useful Improvements in Automatic Telegraphy, of which the following is a specification.

In an application of even date herewith I have shown a card or strip for automatically controlling telegraphic transmissions prepared with the code-symbols in lines transverse of the card or strip, and means for utilizing such a prepared card as the circuit-controller. The means therein shown are adapted only, however, for ordinary automatic telegraphy systems—*i. e.*, systems where the message is in symbols which are a fac-simile of those used in transmitting.

The object of my present improvement is to provide a way in which a card or strip so prepared may be used to control the ordinary step-by-step printing-telegraphs or "tickers," as they are commonly termed, so that while the symbols on the card or strip are simply embossments or perforations of uniform size and character, varying only in their distances from a fixed initial point, the received message will be in ordinary alphabetical or numerical characters, or both. In order to prepare the card for use in this connection, it is preferable to form the parallel transverse rows of embossments or perforations in straight lines, instead of in curved lines, as illustrated in my application for Letters Patent above referred to.

In the transmitting apparatus for use with such a card there are provided devices which normally will keep up, in the the main or type-wheel circuit, the proper sequence of impulses, either alternating or intermittent, to effect or control the step-by-step movement of the type-wheels of the instrument in circuit. Connected therewith are devices controlled by a local circuit, or by the main circuit itself, to automatically stop the main or type-wheel circuit-controlling devices, in order to give time for the printing mechanism to act, and after such action to automatically cause the restarting of the type-wheel circuit-controlling devices. This controlling-circuit at one point is divided into a series of derived circuits, one for each character of the code, and in each derived circuit are two makes and breaks, one being between a key and its anvil, which is controlled by the prepared card or strip, while the other is between a rotating trailer-arm and one of a series of segments upon a disk, with which said arm contacts once during each of its revolutions. In this controlling-circuit is placed an electro-magnet, the armature or armature-lever of which is combined with a stop mechanism in such manner that when the normal condition of the magnet is changed the armature shall actuate the stop mechanism to effect the stoppage of the type-wheel circuit-controlling apparatus. With said armature-lever is also combined a pivoted lever, the arrangement being such that when the magnet is in normal condition the armature-lever holds the pivoted lever in position to immerse a contact thereon in mercury, or to prevent contact therewith, as the case may be, the mercury and pivoted lever forming normally a part of the controlling-circuit. When the normal condition of the magnet is changed, however, the consequent movement of its armature-lever releases the pivoted lever, which thereupon swings by gravity in a direction to make or to break contact with the mercury, as the case may be. If, then, one or more of the keys in the derived-branches of the local circuit are caused by the prepared card to contact with their anvils or to break contact therewith, one make or break in the circuit will be controlled, while the rotating trailer-arm passing over the segments will control the other make or break, and the normal condition of the magnet will be changed with the effect of bringing into action the stop mechanism, and halting the type-wheel circuit-controlling apparatus. The movement of the armature-lever also frees the pivoted lever, which moves from its contact with the mercury, or into contact therewith, as the case may be, thereby automatically causing the transmitter to again proceed. The contact of the lever and mercury is adjustable, so that the period of stoppage may be made just sufficient to permit all the printing-magnets in circuit to operate. A feed mechanism for the prepared card and its holder is arranged to be operated once after each revolution of the type-wheel-circuit controller and the trailer-

arm, and in the interval between the use of any two successive transverse lines on the card or strip; hence all the breaks in the local circuit at the keys and anvils to be closed by the transverse line of the card then in use are closed before the closing of the breaks at the disk and trailer-arm, whereby all sparks are avoided at the former, and the tendency to spark transferred to the disk and trailer-arm, whereby sparking may be avoided, or its injurious effects readily counteracted. The means for effecting these operations will be readily understood by reference to the drawings, in which—

Figures 1 and 2 are details of the transmitter apparatus. Fig. 3 is an end view of the transmitter. Fig. 4 is a side view thereof with a diagram of the circuit-connections. Fig. 5 is a diagram showing the local connections.

In these figures the reference-numeral 46 indicates a commutator for constantly throwing upon the type-wheel circuit, (herein marked "line,") the proper sequence of currents for effecting the step-by-step movements of the type-wheel. In the illustration given the movement of the type-wheel is supposed to be effected or controlled by polarized escapement 22; hence the commutator 46 is arranged to throw upon the line currents from the batteries B B′, (typical of any suitable sources of electric energy,) alternating in polarity. If, however, the escapement 22 were to be operated or controlled by simple intermittent currents, the commutator 46 would be altered as necessary therefor. The commutator 46 is mounted upon a shaft, which receives motion from any suitable motive power, and hence in action is continually charging the line with the proper sequence of currents. The number of contacts on 46 should be equal to the number of spaces and characters on the type-wheels in the circuit. Supposing, as such wheels are ordinarily made, that there are thereon twenty-six alphabetical characters, a period, and a blank space—twenty-eight divisions in all—then the commutator will be arranged to transmit twenty-eight impulses in one rotation, either intermittent or alternating. Each impulse causes or permits the type-wheels to advance one division; but whenever the desired division is presented in position to be printed from it is necessary that the sequence of impulses be interrupted for a period sufficient to permit the printing devices (indicated by the magnet 23) to come into operation, and, after such operation, that the sequence of impulses be automatically resumed—that is, at desired times 46 be stopped, and then automatically started. In this invention it is the function of the prepared card to operate on a controlling-circuit, and thereby control devices for accomplishing these results.

Upon suitable supports, 30, arising from a base, 31, rests a bed, 2, having sides forming guides for a tray, 5, sliding therein and adapted to receive the prepared card 10, which in this case is supposed to be prepared with embossments at the desired and designated points. Transversely of the tray or bed, upon a pin or journal, 13, is secured a set of key-levers, 12, equal in number to the number of characters used in the code and placed upon the type-wheels. For each key there is an anvil, 14, with which the key may be caused to contact. The keys are placed a distance apart equal to the distance apart of the units or numbers of the code or alphabet in the card 10. If, then, the card 10 be placed so that a transverse line of embossments comes beneath the line of keys, the embossments therein will elevate the lower ends of such keys as are thereover, causing such keys to contact with their anvils. The shaft 1 passes through a fixed disk, 3, formed of an insulating-base upon which are fastened a series of metallic segments, 47, equal in number to the characters upon the type-wheels, and also having one blank or insulating space 15. Upon the outer end of 1 is secured an arm 4—the "trailer-arm"—whose outer end is so bent or fashioned as to make good contact with segments 47 as it passes thereon during its rotation. The circuit 60 of a local battery passes to the pin or journal 13, and thence to the keys 12. The series of anvils 14 and segments 47 are connected, each anvil and the corresponding segment, by a connection, 59, forming part of the local circuit. The local circuit 60 also includes an electro-magnet, 16, a mercury-cup, 18, and a pivoted lever, 17, whence it connects with the trailer-arm.

The magnet 16 controls the stop-mechanism of the train, it having an armature, 19, whose outer or free end is formed into a stop arranged, upon the attraction of the armature by the magnet, to take into the recesses on the periphery of a stop-wheel, 21, there being one recess for each segment 47. One end of the pivoted lever 17 is formed into a contact taking into the mercury-cup 18, while the other and heavier end is formed into a U horizontally, an extension of the armature end of 19 taking between the legs of the U. The parts are so adjusted that when the armature is not attracted its end in the U shall take upon the upper limb thereof, and cause the contact-point to dip into the mercury; but when the armature is attracted the lever 17 is freed from control of the armature-lever 19, and then the heavier end falls gradually, eventually breaking the contact between 17 and 18. The amount of this contact between 17 and 18, or the rate of fall of the lever, can be so adjusted as to preserve the contact for a definite period after 19 is attracted by 16.

The feeding of the card is effected as follows: Upon the bottom of the tray 5 is formed a ratchet the length of whose teeth is equal to the distance between the transverse lines on the card 10. In a slot in the bed 2 is pivoted a lever, 7, carrying a pawl-arm, 8, an or-

dinary spring, 9, holding the lever 7 back against a stop-pin. Upon the shaft 1 is an arm, 6, rotating therewith and adapted to take at its outer end against and move the lever 7. The relation of these parts is such that this shall occur at the time the trailer-arm 4 is passing over the blank space 15 on the segment-wheel 3. By the connection of the anvils 14 and the segments 47 the local circuit 60 is divided between them into a number of derived or branch circuits, 59, in each of which are the two breaks referred to. If both breaks in any one are closed at the same time, the entire local circuit 60 is closed. This is illustrated diagrammatically in Fig. 6. While these two points in the local circuit are normally open the break therein at 17 18 is normally closed, the closing of the two breaks causing the opening of the latter, while the opening of the latter causes the opening of the first two and its own closure. With these means and this arrangement of connections, if a prepared card be placed in the tray and its first transverse line brought beneath the range of the keys, the keys corresponding to the indications thereon will be caused to contact with their anvils and close this one break in their respective branch circuits—that is, one set of contacts therein will be closed ready and waiting for the closure of the other break, and completion thereby of the local circuit by the trailer-arm and the appropriate segment 47. As this arm reaches the segment connected to the first key in use, the closure of the circuit causes magnet 16 to attract its armature-lever 19, the stop 20 being thereby thrust into the path of 21, arresting the movement of the shaft and commutator 46, the line being then held closed and its condition at that moment maintained, arresting the movement of the escapement 22 in circuit. As 19 is attracted, it permits 17 to fall, whereby its contact with 18 is destroyed and the local circuit is broken. As before stated, the parts are so adjusted that the interval necessary for this is sufficient to permit all the printing-magnets in circuit to operate. When this has been done, 20 is withdrawn from 21, and the trailer-arm passes to the next segment connected to a closed key, 12, and so on throughout the line. As the trailer 4 reaches the blank segment, the arm 6 takes against the lever 7, and, while 4 is passing over 15, carries 7 sufficiently far to cause the pawl 8 to advance the tray and card the space of a tooth, bringing a new transverse line beneath the keys. Thus the feed is always accomplished during a slight interval between the uses of any two successive transverse lines, the prepared card and the keys remaining stationary during the use of a line, while all tendency to spark is transferred to the disk and arm, which may be readily supplied with the ordinary oil lubricant to obviate the sparking or reduce its effects.

It may happen that it is desired to send a message consisting of but a few words or ciphers, especially in such communications as often necessarily must pass between transmitting and receiving clerks, and that the preparation of such short messages would involve loss of time or unnecessary trouble. I therefore add to this transmitter a device which may be used in lieu of the range of keys, yet involving the same principle of closing one break and maintaining a waiting contact there until the other break is closed. On a suitable base a series of metallic pins or buttons, 25, is arranged, equal in number to the conducting-segments 47, the buttons and segments being connected by circuits 28, as are the segments and keys. A metallic stylus adapted to be held in hand is connected by a flexible wire cord, 27, with the circuit 60, and includes a local battery, as shown. If, now, the stylus be placed in contact with the button 25, representing the desired letter, the local circuit 27 28 60 will be completely closed, and the same sequence of operations take place as in the case of its closure by 12 14 and 4 47.

While in the drawings and in this specification a single-line printing-telegraph circuit is shown—*i. e.*, where the printing-magnet is in the escapement circuit, and is arranged to be operated by a prolonged closure of such circuit or some change in its normal condition, or by the action of the escapement armature-lever on a local printing-circuit—it is evident that the invention is not confined to such a circuit, and that it may be used with a two-wire circuit—that is, where one circuit is used for the escapement and one for the printing, the circuits being each complete and independent.

In the examples hereinbefore given in illustration of my invention, the devices controlling the main-line transmitter have been shown in a local circuit normally open. It is evident, however, that by slight changes in the circuit-connection such devices may be placed in the main line itself, or in a local circuit normally closed and operating on its opening to control the main-line transmitter.

If it be desired to place the transmitter-controlling devices in a normally-closed local circuit, the anvils of the keys are placed so that the keys are normally in contact therewith, but lifted therefrom by the action of an embossment in the prepared card. In this last construction the extra segment upon the disk (herein called the "non-conducting" or "non-connected" segment,) is connected to the pivot-pin of the keys, so that a shunt-circuit to the keys is formed once during each revolution of the arm, maintaining the circuit closed while the feeding mechanism operates. The stop on the armature-lever is so placed on it that the magnet holds it out of operation while its circuit is closed. In this case a branch circuit is formed from the local battery to the mercury-cup and contact, which are adjusted to normally break contact, but upon

release by the armature-lever to form contact after a suitable interval. As the keys are all in circuit, the circuit will always be complete, no matter which segment the trailer-arm is passing over. If certain keys be lifted from their anvils by the embossments of a line to be transmitted, there will be breaks at those points. As the trailer-arm reaches the first corresponding segment, the circuit is totally broken, the stopping-magnet releases its armature, which halts the transmitter. At the same time the contact-lever and mercury-cup are allowed slowly to make contact, which done completes the branch circuit, causing the charging again of the stop-magnet, the release of the transmitter, and its operation until the arm reaches the next segment corresponding to a key operated on. Thus it will be seen my invention may be applied to either the open or closed systems of telegraphy.

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

1. In an automatic transmitter for printing-telegraphs, the combination, with stopping mechanism, of releasing devices brought into action by the operation of said stopping mechanism and automatically operating when thus brought into action to release the transmitter from the control of the stopping mechanism, substantially as and for the purposes hereinbefore set forth.

2. In an automatic transmitter for printing-telegraphs, the combination of a fillet or card having code signals and indications thereon, stopping mechanism controlled thereby, and releasing devices arranged and automatically operating to release the transmitter from the control of the stopping mechanism at the time and in the manner substantially as hereinbefore set forth.

3. In an automatic transmitter for printing-telegraphs, the combination of a card or fillet having code signals or indications thereon with a series of circuit-keys, one for each signal or indications of the code, arranged to be operated each by its appropriate indication on said card, and a single main circuit controlled by all the keys, substantially as hereinbefore set forth.

4. In an automatic transmitter for printing-telegraphs, a circuit embracing stopping and releasing devices and two series of makes and breaks, each series having a single contact or make and break for each character or indication of the code used, one series being arranged to be controlled by a prepared card or fillet and the other arranged to be controlled *seriatim* by a revolving or trailer arm, substantially as hereinbefore set forth.

5. In an automatic transmitter for printing-telegraphs, the combination, with a circuit, of a series of branch or derived circuits thereto in each of which are two makes and breaks only, one controlled by a key and the other by a segment of a disk and a trailer-arm, the makes and breaks of the keys of the branch circuits to be used in one revolution of the trailer-arm being controlled simultaneously and in advance of the makes or breaks at the segments, substantially as hereinbefore set forth.

6. In a transmitter for automatically controlling the operation of printing-telegraphs, a circuit having three points of completion therein, the first normally open or closed, as the case may be, and brought to an opposite condition, when desired, by means, substantially as described, such as the prepared card and its co-operating keys and anvils, the second normally in the same condition as the first, but brought to an opposite condition intermittently by a traveling contact-arm, and the third in a condition normally opposite to the other two, but caused to change condition on change of condition of the circuit through the others, and operating upon such change to restore the normal condition of the circuit, substantially as and for the purposes hereinbefore set forth.

7. In a transmitter for controlling automatically printing-telegraphs, the combination of a commutator which throws upon the line the proper sequence of currents for operating or controlling the printing-escapements, a series of keys and contacts, a disk or wheel bearing a series of contact-plates, a revolving arm passing over and contacting *seriatim* with such plates and rotating with the commutator, a stopping mechanism therefor controlled by a magnet in the circuit, and means controlled by such magnet for controlling said circuit and automatically restarting the commutator and traveling arm into action, substantially as hereinbefore set forth.

8. In a transmitter for controlling automatically the operation of printing-telegraphs, the combination, with a commutator and a revolving contact-arm traveling together, of a disk bearing a series of conducting-segments equal in number to the characters of the code used and one extra segment, a movable holder for the prepared card, and a lever attached to and revolving with the shaft of the commutator and traveling arm and arranged to effect the feed of the card-holder while the traveling arm is passing over the extra segment on the disk, substantially as set forth.

9. In a transmitter for controlling automatically printing-telegraphs, the combination of a series of keys and contacts or anvils equal in number to the characters in the code used, each key and corresponding contact representing one character, and a card or fillet having the indications of the characters to be printed arranged thereon in transverse lines operating simultaneously upon all the keys corresponding to the indications in the line in use, substantially as hereinbefore set forth.

10. In a transmitter for printing-telegraphs, the combination, with a commutator, a disk provided with conducting-segments, an arm

traveling thereon, and stopping and starting devices, substantially as set forth, of a keyboard containing a series of fixed keys or contact-blocks insulated from each other and equal in number to the conducting-segments, a circuit having a branch connection from each key to a corresponding segment, a pen or stylus for manual use connected in the circuit, whereby the circuit may be completed by the contact of the pen or stylus with any key, substantially as hereinbefore set forth.

In testimony whereof I have hereunto set my hand this 3d day of February, 1885.

EDWARD J. MALLETT.

Witnesses:
DAVID MILLIKEN, Jr.,
THOMAS FENTON TAYLOR.