(No Model.) 3 Sheets—Sheet 1.

P. B. DELANY.

MACHINE TELEGRAPHY.

No. 507,791. Patented Oct. 31, 1893.

Fig. 1,

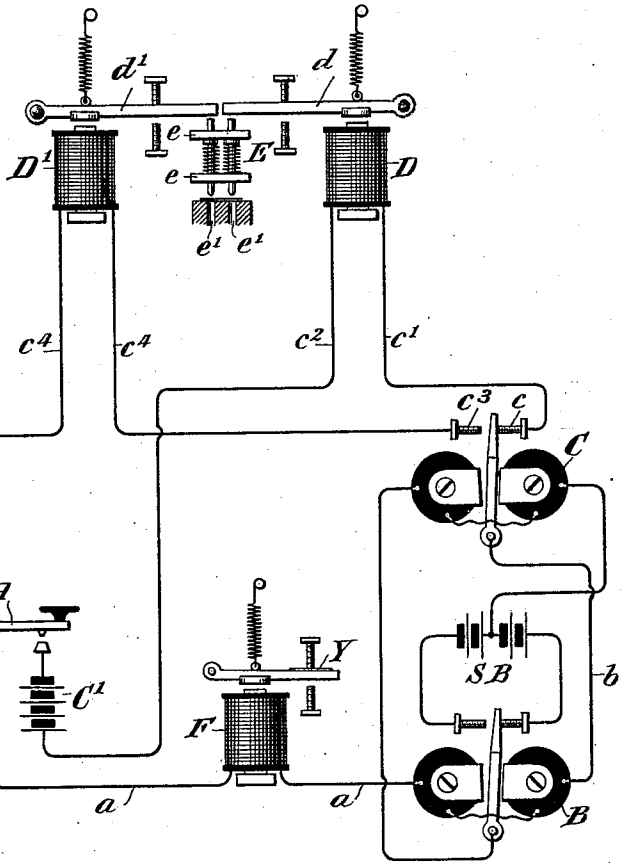

Fig. 2,

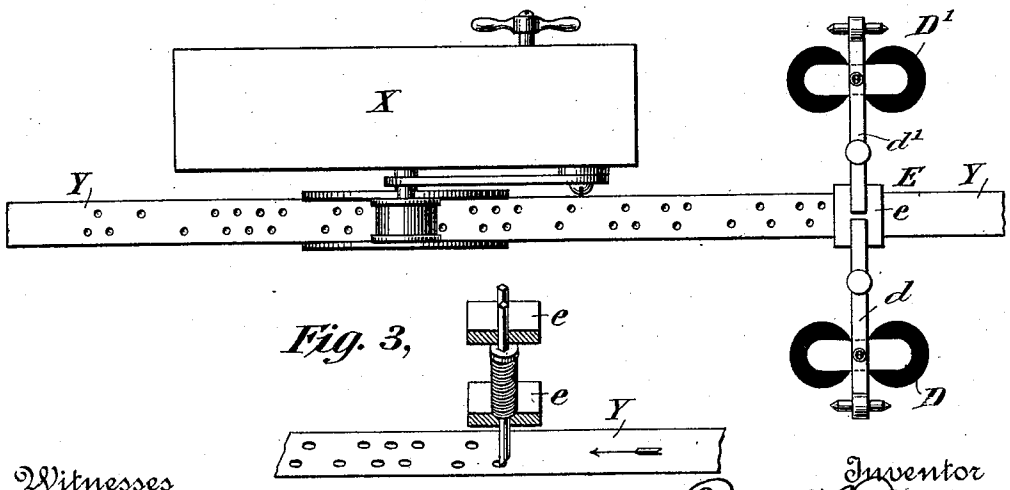

Fig. 3,

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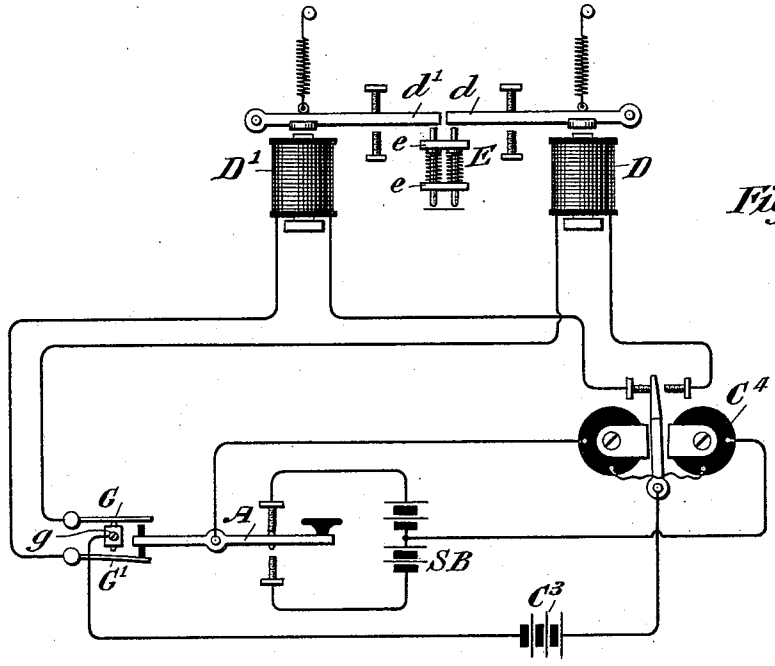

Fig. 4.

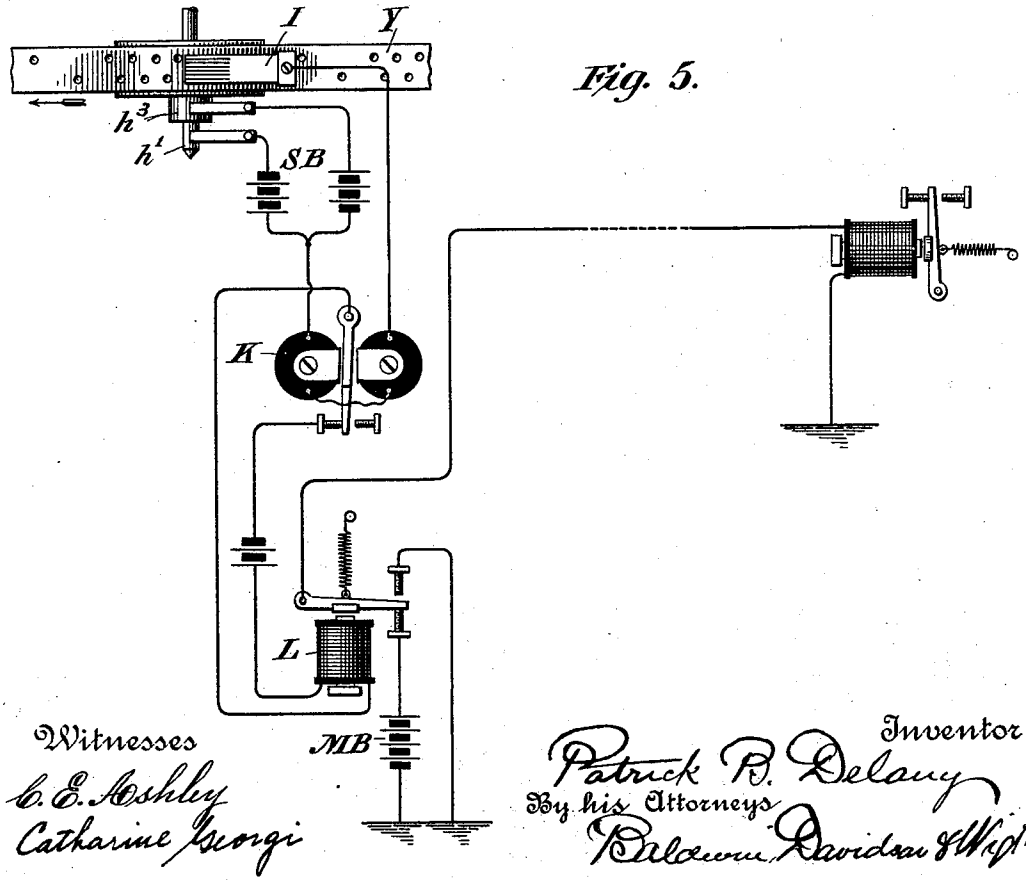

Fig. 5.

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MACHINE TELEGRAPHY.

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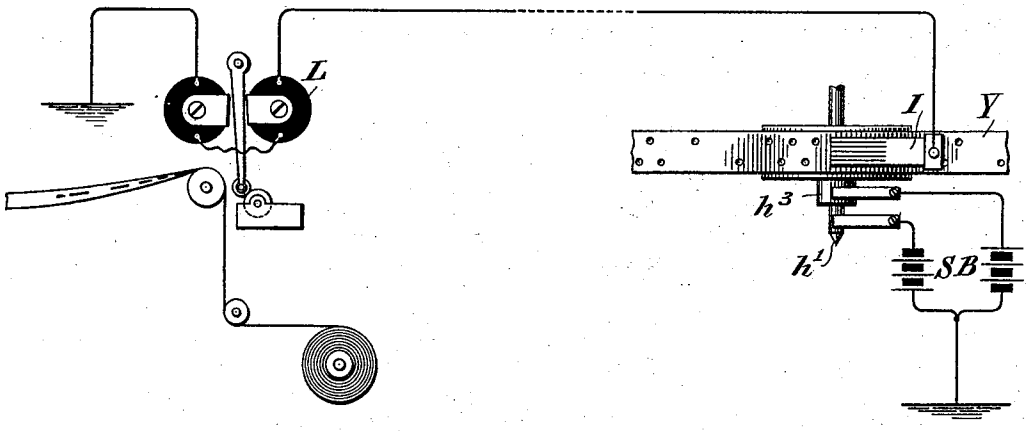
Fig. 6,



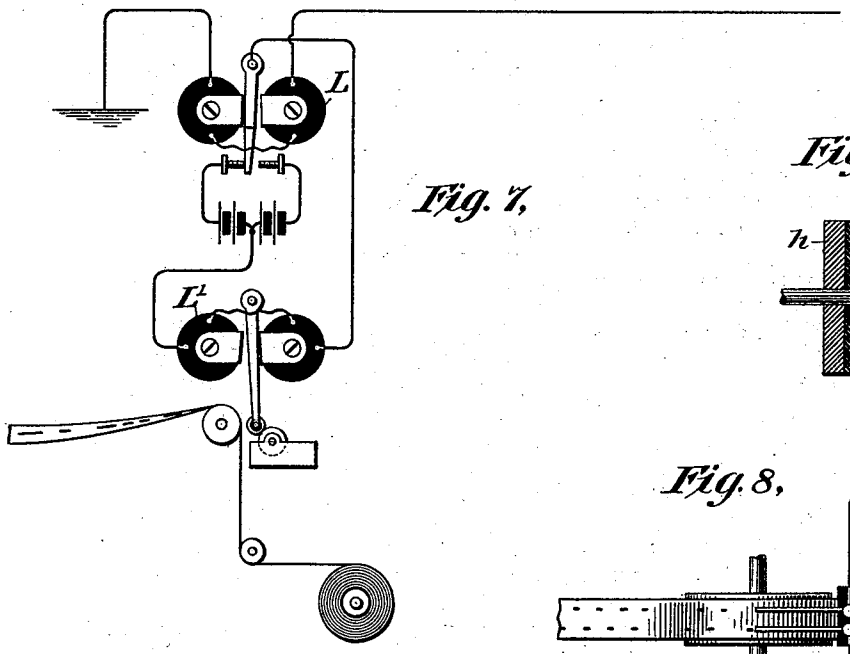


Fig. 7,

Fig. 9,

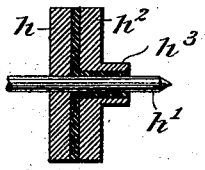
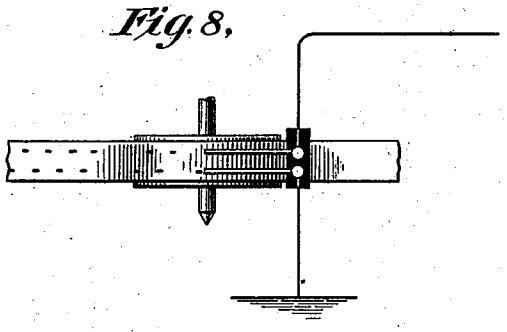


Fig. 8,



Witnesses
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Catharine Georgi

Inventor
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By his Attorneys
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UNITED STATES PATENT OFFICE.

PATRICK B. DELANY, OF SOUTH ORANGE, NEW JERSEY.

MACHINE TELEGRAPHY.

SPECIFICATION forming part of Letters Patent No. 507,791, dated October 31, 1893.

Application filed May 4, 1893. Serial No. 472,950. (No model.)

To all whom it may concern:

Be it known that I, PATRICK B. DELANY, a citizen of the United States, residing at South Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Machine Telegraphy, of which the following is a specification.

My invention relates to that class of telegraphy in which the matter to be transmitted is prepared upon strips of paper or ribbon by perforating the same, such strips being then used to automatically transmit the matter at a high speed.

Heretofore perforating machines (for preparing the ribbon) have been more or less complicated and required a special training and skill to operate them. By means of my improvements, however, any ordinary operator familiar with the use of the Morse key may prepare the perforated ribbons by the aid of a very simple arrangement of devices electrically actuated and controlled by an ordinary Morse key. The matter to be automatically transmitted over the line may therefore be distributed among any desirable number of operators by whom the perforated strips are prepared.

My invention contemplates an improved organization of apparatus controlled by a Morse key, for accomplishing the perforation of the strip, in which the impulses of currents controlling the perforators are always of the same duration, whereby uniform result is obtained, so far as the perforations are concerned, notwithstanding the variations in the manipulation of the key. The invention also includes certain improvements in perforating apparatus and in the means of affecting the automatic transmitter by the perforating strip. The perforations are cut in the strip in two parallel lines. The perforations in one row serve to effect the commencement of the transmission of dots and dashes and those in the other row terminate the signals. The perforations one in each row which represent either a dot or dash are not opposite each other but the perforation which represents the termination of the signal is behind a transverse line passing through the perforation that commences the signal. The length of the signal therefore which determines whether it is a dot or a dash depends upon the length of the inclined line drawn from the perforation in one row to the perforation in the other row.

The accompanying drawings illustrate my invention diagrammatically.

Figure 1 is a view showing the organization for effecting the perforation of a transmitting strip. Fig. 2 is a plan view of the same matter; Fig. 3 a detailed view of the punches. Fig. 4 shows an organization for effecting the perforation somewhat different from that of Fig. 1. Fig. 5 indicates one way of effecting the automatic transmission from a perforated strip or ribbon. Figs. 6 and 7 show ways of recording the automatically transmitted matter. Fig. 8 shows an arrangement for chemical reception in which the receiving strip of chemical paper is marked with dots corresponding to the perforations of the transmitting strip. Fig. 9 is a detailed view of the transmitting cylinder employed in Figs. 5 and 6.

Referring to Figs. 1 and 2, X represents a spring actuated or other suitable mechanism for continuously drawing the paper or other ribbon through the punching devices, and Y indicates the ribbon that is being perforated. The Morse key A is connected by a wire *a* through the coils of the polarized magnet or relay B and thence by wire *b* to the armature lever of a second polarized magnet or relay C. One stop *c* of this latter relay is connected by a wire *c'* through the coil or coils of a punch or perforating magnet D and thence by wire c^2 to one pole of the battery C', the opposite pole of which is connected to the front stop or anvil of the key. In the drawings, the armature lever of C is shown against the stop *c*. The other stop c^3 of the polarized magnet C is connected by wire c^4 through the coil or coils of another punching or perforating magnet D' and passes thence to one pole of the battery C^2 the opposite pole of which is connected to the back stop anvil of the Morse key A. The armature lever of the polarized magnet B plays between two stops connected with opposite poles of a split battery S B, the middle of which is connected through the coils of the polarized magnet C from whence the circuit passes to the armature lever of B. The perforating magnet D has an armature lever *d* and the magnet D' has an armature lever

d' both of which are provided with the ordinary retractile springs and front and back stops. Under the end of each of these armature levers is a perforator or punch E having its bearing in frame pieces e and normally thrown up by a spiral spring. The ends of the punches that pass through the upper frame piece c are of angular cross-section and are therefore prevented from turning. Their lower cutting ends are circular in cross section and the cutting face is beveled so as to give a shearing cut as the punches enter the corresponding dies e' e'. The paper ribbon is continuously drawn when the apparatus is in use between the dies and punches by the mechanism X. The beveled cutting faces of the punches are on the sides from which the paper strip approaches.

The magnet F and its functions are presently described. The apparatus being in the condition indicated in Fig. 1 and the paper ribbon being drawn under the punches, when the key A is depressed the circuit of the punching magnet D is completed as is obvious from the drawings and attracts its armature which with a quick blow drives its corresponding punch through the paper. This operation is instantaneously performed and the circuit of the magnet D is immediately interrupted at the armature lever of C because the same impulse of current that charged the magnet D also charged the polarized magnet B, and effected a reversal of its armature which caused the movement of the armature of C away from the stop c to the stop c^3. The punch was therefore immediately thrown up by its spring. The brief moment of time occupied in these operations, is not sufficient to materially check the movement of the paper and a clearly cut perforation of the paper is effected. When the key is raised, and the circuit at its back stop completed, the operation is repeated, the perforating magnet D' being briefly charged to actuate its punch. As the punches are arranged side by side in a line transverse to the paper ribbon the perforations will be in two parallel lines and each perforation effected by the magnet D' will be more or less behind the corresponding perforation effected by the magnet D. The length of the inclined line drawn from the perforation in one row produced by the magnet D to the perforation in the other row produced by the magnet D' will determine whether the signal is a dot or a dash. For instance referring to Fig. 2, at the left hand end of the strip, the two perforations at the extreme left will indicate a dot and the next two perforations a dash. The length of this inclined line of course depends upon the manipulation of the key A. An operator accustomed to the use of the Morse key may manipulate the key exactly as an ordinary Morse transmitter, and effect the proper perforation of the strip as seen for instance in Fig. 2. As the beveled faces of the punches are on the side from which the paper approaches, it is obvious that as soon as the highest point of this beveled cutting surface of a punch leaves the paper there will be a clearance of the paper from the punches so that there is practically no interruption whatever of the flow of the paper during the operation of punching, such momentary checking of the paper as may occur before the punch commences to rise, being compensated by its elasticity. In order to insure uniformity and prevent the racing of the paper ribbon under the strain of the drawing mechanism, after it is released from the punch, I prefer to adopt a tension device which may be substantially as follows:—The coil of the magnet F is included in the circuit wire a leading from the key. Its armature lever is normally retracted by its spring, and the paper strip either before or after it leaves the punching device, passes between the armature lever and its upper stop as shown. During the moment that either of the punch magnets is energized the magnet F also is energized and its armature is attracted thus releasing the tension on the paper ribbon which runs between the end of the armature lever and the back stop and simultaneously with the release of the ribbon by the punch the armature of F rises and the paper ribbon is clamped between it and the back stop, which imposes a tension upon the ribbon and prevents its abnormal flow or racing under the strain of the drawing devices.

A somewhat similar manner of controlling the punch magnets D D' is shown in Fig. 4. In this organization, I employ a single battery C^3, one pole of which is connected to the armature lever of a polarized magnet C^4 the stops of which are respectively connected through the coils of the punch magnets D D' with contact springs G G'. Its opposite pole is connected with a contact block g placed between the two springs G G'. An insulated piece on the end of the key lever operates the springs G G' and serves to connect the battery alternately through D and D' as the key is depressed and raised. The center of a split battery S B is connected through the coils of the polarized magnet C^4 to the key and the opposite poles of the split battery are respectively connected with upper and lower contacts against which the key works. As a result of this organization, each time that the circuit of the battery C^3 is completed through either the magnet D or D', it is immediately opened by the reversal of this polarized relay C^4. In this organization, the magnet F may also be employed and could be placed between the battery C^3, and the contact block g. For many reasons I prefer in practice to use the organization shown in Fig. 1.

In Fig. 6, I have shown a method of transmission and reception suitable for this system. The perforated strip Y passes over the transmitting cylinder divided circumferentially as shown in Fig. 9 with insulation between the two halves. h represents one-half of the cylinder, which is in electrical contact

with the shaft h'. The other half of the cylinder h^2 is insulated from h and from the shaft and has a hub h^3. A split battery S B is grounded in the middle and its two poles are respectively connected with brushes that respectively bear upon the shaft h' and the hub h^3. The perforated ribbon Y is drawn over the cylinder under a contact brush I, having a split or feathered end broad enough to cover both lines of perforations. This brush is connected to the main line which passes through the coils of a distant receiving polarized instrument I to earth. Whenever the brush makes contact through one of the perforations in the lower line with the part h^2 of the transmitting cylinder, an impulse passes from the right hand portion of the battery S B over the line, and causes the receiving polarized relay to throw its armature to the left, this being the commencement of the signal; and when the brush makes contact through one of the perforations in the other row with the part h of the transmitting cylinder, a reverse current is sent over the line, and the armature of the polarized receiving instrument is thrown in the opposite direction, thus terminating the transmitted signal. The length of the signal is of course determined by the length of the inclined line drawn from the perforation which commenced the signal to that which terminated it. In this figure the armature lever of the receiver L carries a roller that makes contact with an ink wheel running in an ink pot, and in recording a signal is thrown against a paper ribbon drawn continuously over a roll adjacent to the armature lever and upon which the received signal is represented in dots and dashes. In Fig. 7 I have indicated a similar method of reception except that the polarized receiver L acts as a relay for a second polarized instrument L′ operated by a split battery controlled by the armature lever of I.

In Fig. 8 I have illustrated a plan for chemical reception in which the received signals are represented upon a prepared strip by dots and dashes corresponding to the perforations in the transmitting strip. The chemically prepared ribbon is drawn over a metal cylinder under two parallel fingers insulated from each other, and one connected with a main line and the other with earth or the other side of the circuit. As is well understood a positive current would produce a discolored dot upon the paper under one of the pens or fingers and a negative current produces a similar dot under the other finger.

It is obvious that the key A in Figs. 1 and 4 may be a lever operated in any suitable manner, either by hand to prepare perforated strips locally, as already described, or from a distance by an electro magnet. In the latter case, the organization might be used for reception, and in that event the received message would be recorded upon the paper ribbon by perforations, which might then be used for retransmitting or relaying the message into another circuit.

In Fig. 5 I have shown an organization for transmission wherein the transmitted impulses of current are sent from a single pole of a main battery and are received upon a neutral relay or receiving instrument. In this organization I employ a transmitting cylinder, split battery and perforated ribbon precisely in the manner described in connection with Fig. 6, but the current from the split battery instead of passing to line is used locally to effect reversals of a polarized relay K, in the local of which is a neutral magnet L. The front stop of this latter magnet is connected with one pole of a main battery M B the opposite pole of which is grounded or connected to the other side of the circuit, and the back stop is connected to earth or to the other side of the circuit. The main line is connected with the armature lever of L and thence with the coil of a neutral receiving magnet at the distant station. The operation is obvious. Each time that L attracts its armature lever the main battery M B is sent to line for a period depending upon the time during which the armature lever of K is against its left hand stop, which is determined by the length of the inclined line drawn from the perforation in one row which initiates a signal, to the perforation in the other row, which terminates it. When the armature lever of L is retracted, the main line is discharged or grounded through its back stop. The transmitted signals are therefore received upon the neutral receiving instrument as ordinary dots or dashes that may be read by sound or recorded in any suitable manner. An ordinary sounder, recorder or repeater may be included in a local circuit controlled by the neutral receiving magnet.

I may omit the neutral magnet L, and connect the line with the armature lever of K, one stop of which would then be connected to the main battery and the other to earth.

I claim as my invention—

1. The combination of the duplicate punches and dies, means for drawing the ribbon between them, the punch magnets, one for each punch, the polarized instrument C, battery and circuit connections whereby the punch magnets may be alternately energized by the manipulation of the key or lever, and the second polarized instrument B and its circuit connections, whereby the circuit of each punch magnet is automatically instantly opened after its completion at the key or lever by the reversal of the instrument C.

2. The combination of the duplicate punches and dies, the punch magnets, a key or lever at the front and back stops of which the circuits of the punch magnets are respectively controlled, a polarized instrument at the two stops of which the circuits of the punch magnets are also respectively controlled, a second polarized instument ener-

gized when either punch magnet circuit is closed by the manipulation of the key or lever, and means whereby said second polarized instrument effects the reversal of the first polarized instrument, substantially as and for the purpose set forth.

3. The combination of the duplicate punches and dies, the punch magnets, a key or lever at the front and back stops of which the circuits of the punch magnets are respectively controlled, a polarized instrument at the two stops of which the circuits of the punch magnets are also respectively controlled, a second polarized instrument energized when either punch magnet circuit is closed by the manipulation of the key or lever, means whereby said second polarized instrument effects the reversal of the first polarized instrument, and a tension magnet (F) included in a circuit connection controlled by the key and common to both punch magnet circuits.

4. The combination of the punches and dies, their magnets, one for each punch, the armature of each magnet adapted to deliver a blow upon its punch when the magnet is energized, a spring to automatically return each punch to its normal position after being thus struck, a Morse key or lever by the operations of which the circuits of the punch magnets are closed, and means interposed between such key or lever and the punch magnets whereby the circuit of each punch magnet is automatically opened after being closed, irrespective of the position of the Morse key or lever.

5. The combination of the punches and dies, their magnets, one for each punch, the armature of each magnet adapted to deliver a blow upon its punch when the magnet is energized, a spring to automatically return each punch to its normal position after being thus struck, a Morse key or lever by the movements of which the circuits of the punch magnets are closed, and circuit connections and electro magnetic devices interposed between such key or lever and the punch magnets, whereby the circuit of each punch magnet is automatically opened after being closed, irrespective of the position of the Morse key or lever, and means for continuously drawing the ribbon to be punched or perforated between the punches and dies.

6. The combination of means for continuously drawing the ribbon to be perforated, the duplicate punches and dies arranged in a line transverse to the ribbon and between which the ribbon is drawn, electro magnetic devices for alternately operating the punches to perforate the ribbon in parallel rows, a Morse key or lever by the operation of which the circuits of said electro-magnetic devices are controlled, a tension device also controlled by the manipulation of the Morse key or lever, whereby when said electro magnetic devices are energized to actuate the punches, the tension is removed from the ribbon and when the punches are out of operation, the tension is automatically applied thereto, substantially as set forth.

7. The combination with means for continuously drawing a ribbon to be perforated, of a punch for perforating the ribbon having an inclined cutting edge or face extending from the lowest point of the punch upwardly and on the side from which the paper approaches, and means for actuating the punch.

8. The combination of the duplicate punches and their dies electro magnets one for each punch, each having an armature lever adapted to strike the punch when the magnet is energized, a retractor for automatically returning the punch to its normal position, a Morse key or lever by the manipulations of which the punch magnets are alternately energized and means for continuously drawing the ribbon to be perforated under the punches, each punch having an inclined cutting face on the side from which the paper approaches.

9. The combination with transmitting devices, battery and circuit connections, whereby the transmitting strip may be utilized to effect reversals of current in a local circuit corresponding with the signals to be transmitted over a line, each local signal being initiated by a current of one polarity and terminated by the succeeding current of opposite polarity, of a polarized instrument in such local circuit, a main battery, a line, a distant neutral receiver and circuit connections and contacts controlled by the local polarized instrument, whereby currents of uniform polarity are sent into the line from the main battery to transmit the dots and dashes corresponding with those represented by the reversals of current in the local circuit.

10 The combination with transmitting devices, battery and circuit connections whereby a transmitting strip may be utilized to effect reversals of current in a local circuit corresponding with the signals to be transmitted over a line, each local signal being initiated by a current of one polarity and terminated by the succeeding current of opposite polarity, of a polarized instrument in such local circuit, a main battery, a line, a distant neutral receiver, and circuit connections and contacts controlled by the local polarized instrument whereby currents of uniform polarity are sent into the line from the main battery to transmit the dots and dashes corresponding with those represented by the reversals of current in the local circuit, and a contact through which the line is discharged during the intervals between the transmitted impulses.

In testimony whereof I have hereunto subscribed my name.

PATRICK B. DELANY.

Witnesses:
FRANK S. OBER,
EDWARD C. DAVIDSON.