(No Model.) 2 Sheets—Sheet 1.

E. J. MALLETT.

AUTOMATIC TELEGRAPHY.

No. 343,043. Patented June 1, 1886.

Fig. 1.

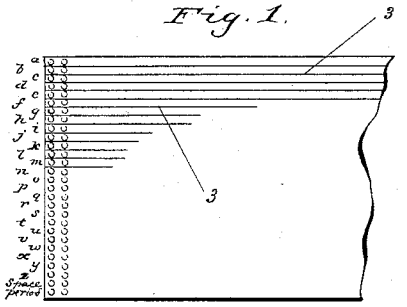


Fig. 2.

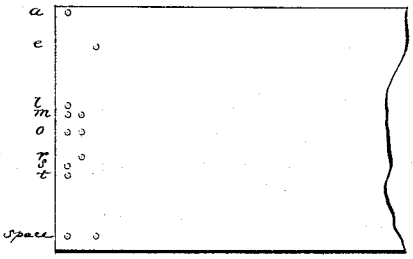


Fig. 3.

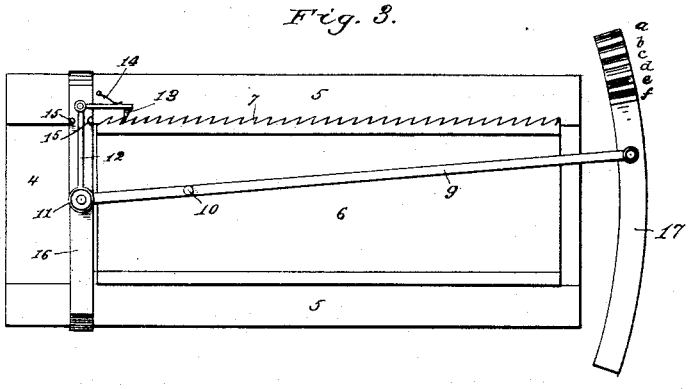


Fig. 4.

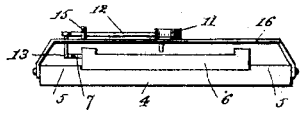
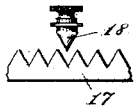


Fig. 5.



Witnesses:
A. N. Lord
J. Walter Blandford

Inventor:
Edward J. Mallett
by Hamilton Baily
his attorney

(No Model.) 2 Sheets—Sheet 2.

E. J. MALLETT.

AUTOMATIC TELEGRAPHY.

No. 343,043. Patented June 1, 1886.

Fig. 6.

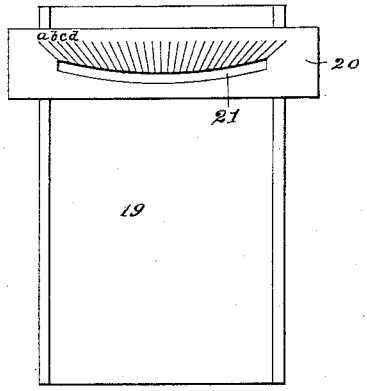


Fig. 7.

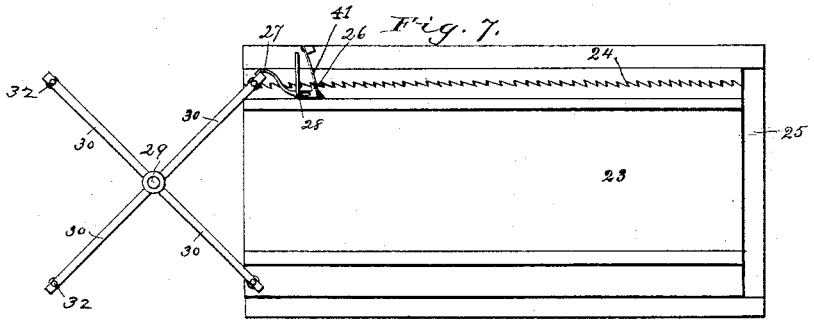


Fig. 8.

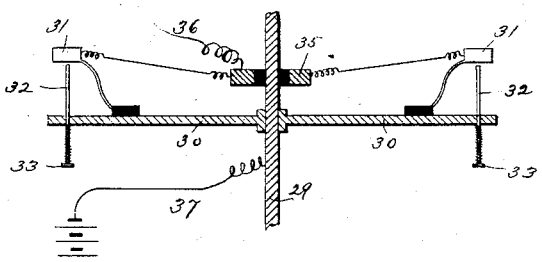
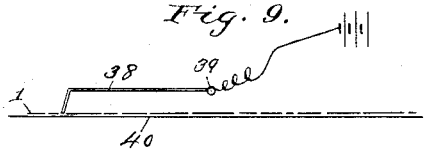


Fig. 9.



Witnesses.
H. N. Low
J. Walter Blandford

Inventor.
Edward J. Mallett
by Maculloch Bailey
his attorney

UNITED STATES PATENT OFFICE.

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

AUTOMATIC TELEGRAPHY.

SPECIFICATION forming part of Letters Patent No. 343,043, dated June 1, 1886.

Application filed February 7, 1885. Renewed April 30, 1886. Serial No. 200,738. (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 a prior application, Serial No. 152,255, I have set out some of the causes which negative any great degree of speed in electric telegraphy where the Morse code is used, and the operation of controlling the circuit for the transmission of the signals is accomplished either manually or automatically, and I described in said application a remedy therefor, involving among other things the use of a code wherein all the signals or symbols are simple impulses of like character and duration, the meaning of any one being determined by its relative distance from a fixed initial point. Even in such a system where but a single impulse is used for each member of the code if the transmission is to be effected automatically the means prepared upon the fillet or strip to control the transmission will extend lineally over considerable space, necessitating the use of long lengths of fillet or ribbon, and rendering somewhat tedious the comparison or reading of the prepared fillet.

In view of these facts the object of this invention is to prepare a fillet or circuit-controlling card in which a very large number of character signals or symbols shall be arranged in a very short lineal space, so that the large number of character signals or symbols may be readily inspected without the necessity of manipulation of many feet or even yards of fillet or ribbon, and also to furnish means for the preparation of such a fillet or card and means for its utilization as a transmitting or circuit-controlling agent.

In carrying my invention into effect the code-symbols, whether embossments or perforations, are arranged transversely upon or across the face of medium used for their reception, instead of lineally or lengthwise thereof, and it is this feature that mainly characterizes my invention. By such an arrangement there can be placed on the average upon a strip six inches long, and wide enough to receive one alphabet or code, as many characters or symbols as could be placed lineally upon a fillet some twenty three or four feet long. I can thus bring a prepared message into exceedingly compact form, and the strip which carries it may be considered to be a card rather than a fillet. I shall consequently refer to it hereinafter as the card. Arranged transversely of the card the meaning or signification of the symbols is determined by their relative distance from each other and from one of the edges of the card, or it may be from a fixed initial point at or near such edge. This card may be of any suitable material such as used for transmitting-fillets, and the symbols can be placed thereon either by perforating, by embossing, or by the application of an insulating substance, this depending upon the material of which the card is made and other circumstances.

When the card is to be used in ordinary automatic telegraphy, alphabets or codes can conveniently be formed thereon in lines which are the arcs of circles. These lines of alphabets may follow each other at a very small distance apart, say, the thirty-second of an inch, so that thirty-two complete alphabets can be formed in the lineal space of an inch. To form these curved transverse lines of characters on the card, I prefer to make use of an embosser or perforator, in which is combined a holder for the card, a pivoted punch or embossing-lever, which sweeps over the face of the card, and is capable also of slight movement to and from it, and an intermittently-operating feed mechanism, which, after the lever has completed one transverse line and before it begins the next, acts to feed along the holder or card a distance equal to that which should separate those lines from each other. At the outer end of the embossing-lever is an ordinary knob or handle for manipulating the same, and that end sweeps over an index-scale marked with the characters of the code. Under this arrangement the lever can be turned until it stands over any desired character on the index, and, if depressed while in this position, it will operate on the card at the proper distance from the fixed initial point to designate thereon the said character. The lever, after each traverse, is brought back again to the starting-point to begin a fresh line, and during this interval the feed mechanism operates to advance the card-holder or card a distance equal to that which should

intervene between succeeding lines. As thus described, this perforator or embosser operates upon the card from right to left. If, however, the card after preparation be taken from the tray and reversed, the symbols will read in the usual way from left to right.

As it is desirable to readily translate the prepared card with a view to ascertain whether or not it is correct, the card may be spaced off by lineal lines or rulings, and the spaces properly marked to designate the character of the symbols occupying the same, so that the meaning of any symbol (depending as it does only on its relative position in the line) may be indicated visually, and, as a further aid, the lines, spaces, and indices, either or all, may be of contrasting or distinguishing colors. A simple mechanical translator can be made by using a bed of a width to receive the card, and having slightly raised sides upon which is superposed a slide grooved to fit upon the sides. In the slide is a slot of form and size corresponding to one of the lines of symbols on the card, and adjoining one of the edges of the slot is an index of the symbols. Thus, when the slide is moved to bring the slot over any one line, the meaning of the symbols in that line can be readily ascertained from the index.

If it be desired still further to abbreviate the lineal space which messages are to occupy, the card may be of a width to accommodate in one line two or more alphabets or signal-codes. In such event two alphabets or signal-codes may be so grouped that the symbols appertaining to the one shall occupy the spaces between those of the other. Under this arrangement—which, it may be remarked, is more particularly adapted for a card having perforated symbols—it is of course necessary that the distance between successive signals of the same group should be about twice as great as otherwise would be required.

The transmitting apparatus used in connection with the prepared card will necessarily vary somewhat in the details of its construction and arrangement, according as the symbols are in the form of embossments or perforations, &c. In the case of an embossed card I can use, for example, a simple arm, which carries the contact mechanism and sweeps over the face of the card along the line of embossments. On the other hand, in case the card is perforated, instead of being embossed, it is preferable to use in connection with the arm aforesaid contact mechanism which is stationary in the sense that it is not carried by the arm, but which is depressed or otherwise appropriately acted on by the arm. In any event, however, the transmitter will contain the combination of the contact operating-arm, contact mechanism intermittently operated by said arm and controlled in its circuit making and breaking action by the conjoint action of the said arm and the prepared card, and an intermittently-operating feed mechanism which, in the intervals between the operation of the contact mechanism, feeds the card in a direction at right angles to the transverse lines of symbols thereon a distance equal to that which separates one line from the next, so as to bring the successive transverse lines into position under the contact mechanism. It will be noted that by this plan of transmission the card, unlike the transmitting-fillet hitherto usually employed, is at rest absolutely during the period in which the circuit making and breaking devices operate. I find that I can thus obtain a much more accurate and certain action of the circuit making and breaking devices than is otherwise practicable.

The improvements in automatic telegraphy thus generally set forth may be better understood by reference to the drawings, in which they are typified, wherein—

Figure 1 is a part of a card showing the improved code. Fig. 2 is a part of a card containing a portion of a message ready for transmission. Fig. 3 is a plan view showing the arrangement of parts in the embosser or perforator for preparing the card; Fig. 4, a rear end view thereof; Fig. 5, a detail thereof; Fig. 6, a plan view of a mechanical translator; Fig. 7, a plan view of a transmitter; Fig. 8, a side view of the arms and contacts therein, and Fig. 9 a side view of part of a modified transmitter.

In Fig. 1 is shown a card marked with two entire alphabet-codes in parallel lines transverse to the length of the card, the meaning of any member thereof being determined by its distance from the upper edge. The codes are arranged in lines transversely of the card, a slight space, say, the thirty-second of an inch, being left between two succeeding code-lines. The card may be marked lineally by rulings or lines 3 3, dividing it into spaces corresponding to the members of the code, each of which spaces may be marked to indicate what member thereof it is appropriated to. These indices—viz., the letters of the alphabet, &c., the lines, and the spaces, or such of them as is deemed best—may be marked in contrasting colors, so as to be more readily discernable and more easily followed.

In the example given in Fig. 2 the symbols in the first line are so placed as to indicate the letters "a l m o s t," while those in the second indicate "m o r," and that in the third "e," spelling the word "more."

In Figs. 3 and 4 is shown the preparer 4, being a bed having sides 5, forming guides between which slides the tray or holder 6, also having sides between which is to be placed the card to be prepared. Upon the edge of one of the sides of the tray is formed the ratchet 7, whose teeth are a distance apart equal to that used between the code-lines. To a cross-arm, 16, rising from 4 and passing over the tray 6, is pivoted a lever, 9, in such manner as to be capable of a downward as well as horizontal movement. Upon its under side at a proper distance from its fulcrum is placed a punch or

die, 10. At its outer end the lever 9 is provided with a handle by which it may be grasped and moved over the index-scale 17, upon which are marked the indices of the code in such relative positions that whenever the handle is placed over a particular character the punch or die 10 will be in position to make the same in its proper relation upon the card, and if the lever is then depressed the character is embossed or perforated in the card. The bed of the tray or holder in which the card rests should, in order to permit the embossments to be made, be formed to permit the local depression of the card by the dies. This can be done by facing the bed with a soft material—such as felt; or, better still, by forming in the bed at proper points recesses in the nature of matrices. In order to aid in having the die or punch 10 take at exactly the proper point on the card a V-shaped projection, 18, is attached in the under side of the lever, while the rim of 17 is cut in a saw-tooth fashion, each cut corresponding reversely to the shape of 18, so when the lever is depressed 18, taking in a toothed cut, will be guided thereby and cause the lever to bring 10 upon the card at the needed point. Upon the pivot of 9, so as to be capable of movement therewith, is mounted an arm, 12, by means of a friction-collar, 11. At its outer end this arm plays between stops 15 15, the space between which is such as to permit the arm sufficient play equal to the length of the teeth on 7 to move the pawl 13, which it carries at its outer end a distance equal to that which separates the code-lines from one another. The pawl 13 is maintained normally in contact with the ratchet 7 of the card tray or holder by a spring, 14. If, now, the lever 9 be supposed to be at *a* on scale 17 and then moved toward the other end of the scale, the arm 12 will be carried thereby against the right-hand stop 15, causing the pawl 13 to slide over one tooth of the ratchet and to engage therewith, and 12 and 13 will thus remain until the lever, after having completed its traverse of the scale, or so much thereof as requisite, is swung back toward the starting-point. By this backward movement of the lever the arm 12 is carried to the left-hand stop 15, causing the pawl to pull the tray to the space of one tooth, and thereby effecting its feed for the next transverse code-lines. As the lever 7 carrying the punch or die swings upon a pivot or fulcrum the code-lines will be made in the arc of a circle and a series of them will be in concentric transverse lines.

If the card is marked or indexed as shown in Fig. 1, the correctness of the preparation of the card may be immediately determined. If, however, the card be without index lines, and it is desired to examine as to the correctness, a mechanical translator or reader may be used—such, for instance, as shown in Fig. 6, where 19 is a bed with slightly-raised edges, between which the card to be inspected is placed. 20 is a slide, having a groove formed in its under side, whereby it may be guided along the raised edges of 19 and its relation to the card placed therein preserved. In the slide 20 is cut a slot, 21, of the same size and contour as the code-lines on the card, upon or near one of whose edges are placed indices, showing to what particular character each space or mark is appropriated. By sliding 20 then over the successive code-lines on the card the indications thereon may be readily translated. A simple translator of this fashion may be manipulated by one hand alone, while the other is left free for transcribing.

A simple and effective form of transmitter to be controlled by an embossed card thus prepared is indicated in Figs. 7 and 8, wherein 23 is a holder or tray capable of sliding in a bed, 25, the tray and bed being similar to the bed and tray 4 and 6 in Figs. 3 and 4. The edge of one of the sides of the tray 23 is fitted or formed with a ratchet, 24, of same size and character as ratchet 7. Upon the corresponding side of the bed 25, by means of a pin, 28, is secured a pawl, 26, the toothed end of which is bent so as to take into the ratchet 24, while its outer end is bent so as to form a tail, which shall lie in the path of the arms 30. The pawl-arm is slotted, the pin 28 passing into the slot, so that the pawl-arm can reciprocate upon the pins, the slot being of such length that the amount of movement permitted to the pawl is just equal to the space of one tooth and to the distance apart of the code-lines. A spring, 41, pulls the pawl back to normal position after the latter has been released from control of that one of the arms 30 by which it may have been moved forward. In the position of parts shown in the drawings an arm 30 has just met the tail of the pawl. Continued movement of that arm causes the latter to move forward, the pawl with it, a distance equal to one tooth of the ratchet. By that time the arm will have cleared the tail of the pawl, and the spring at once returns the latter to its normal position, which is the position represented in Fig. 7.

29 is a shaft, receiving motion from any suitable motive power. Attached to it are a series of arms 30, four in number in this case, but which may be in any desired number. These arms are designed to effect the operation of the contact mechanism, which in this instance is carried by them, each arm having its own contact-making device. One convenient form of such a device is shown in the drawings, and will now be described.

At the outer extremity of each of the arms is seated a pin, 32, having at one end a head, 33, and maintained in one position normally by small coiled springs. Above and slightly removed from each pin is an anvil or contact-block, 31, supported from the arm by a bracket, which is insulated from the arm. Upon the shaft 29 is secured a collar, 35, insulated therefrom, from which electrical connections are formed to each anvil or contact-block 31. From a battery or other source of electric en-

ergy, a connection, 37, is made to the shaft 29, while the collar 35 is connected to the line 36. It will be seen then that there is in this organization, taken in connection with the line and distant station, a complete electric circuit, with the exception of a break at 31 32. If, now, the prepared card be placed in the tray 23, with its embossments in the upper side, and the shaft 29 and its attached arms 30 caused to rotate, each contact-pin 32 will pass over its appropriate code-line in the card, and as the head of the pin impinges upon an embossment the pin will be forced upwardly into contact with its anvil 31, closing the circuit momentarily and sending the desired impulses at the proper time. When, as in this instance, four arms are used, the transverse code-lines will be quadrants of a circle; but if more or less arms are used the arc will be varied proportionately. As the shaft and arms rotate continuously in one direction, one arm and its pin are nearly at the beginning of the path over the card as the arm and pin in advance are just passing off such path. At this latter point the end of such arm takes against the tail 27 of the pawl-arm and carries it along to the limit of its motion, causing it to feed the card forward one tooth and bring a fresh code-line beneath the arm in rear, which then commences its path over the card. Any suitable spring may be used to restore the pawl to its normal position, in readiness to again effect a feed. The contact mechanism and feed thus operate alternately, the one acting while the other is out of action.

While in the illustration given but one code or alphabet is shown in each transverse line, it is evident that more may be used in each line, the preparing and transmitting device being proportionately enlarged. This will result in still further abbreviation of the lineal space occupied by messages, which end can also be accomplished in the following manner, which gives also a much larger space between the members of each code-set. This method is to make two code sets in each transverse line, the number of one set being formed in the spaces of the other set, in which case the card would be of double the width of that used with only one set, and the members would be twice as far apart. To prepare such a card, the card-preparer should be double the ordinary width, and consequently the alphabet or code index, although having only twenty-eight characters, will be twice as long as that of a single card-preparer. A double-width card is now placed in the preparer, and is embossed or preferably punctured. When the first message has thus been prepared upon the card, it will be similar in all respects to a message on a single card, except in the feature that the characters in each line are twice as far apart. In order to prepare on the same card after this a second message or a continuation of the first message, the card is replaced in the preparer in exactly the same position which it occupied at the beginning of the preparation of the first message, and then either one of two things can be done—the stylus or punch may be moved laterally one-thirty-second of an inch, (for which purpose it should be made adjustable,) or the alphabet or code-index may be moved laterally the same distance, (in which event said index should be made adjustable.) After either one of these changes is made it is evident that if the preparation of the second message, or the continuation of the first, be proceeded with, the characters of the same will in each line come between those of the first message. When this arrangement is adopted, the indications should preferably be perforated instead of embossed, necessitating a modified form of transmitter, the principle of which is indicated in Fig. 9. In connection with what is there shown, the shaft 29, arms 30, the tray and feed are to be used, as in the case of the transmitter used with embossments. The pins 32 are, however, made stationary in the arms 20, and the contact blocks or anvils, the collar, and the circuit connections are dispensed with.

Transversely across and over the tray is arranged a metallic comb, whose teeth are in the same arc or line as are the perforations in the card, and which are equal in number to the members of the code and at a like distance apart. This comb may be formed of resilient teeth cut from a metallic strip and united by the uncut portion of such strip; or it may be formed of separate teeth united to or pivoted upon a metallic pin or bearing common to them all. One of these teeth, 38, is shown in side view in Fig. 9, attached to the back of bearing 39, it being understood that there are attached thereto as many of such teeth as there are symbols in the code used. The free end is bent downward to form a stylus, adapted to contact with the bed of the tray if metallic, or with a metallic plate, 40, placed therein and on which the card 1 is to rest. 39 and its attached teeth form one terminal of an electrical circuit, while the bed on the plate 40 forms the other terminal. In the figure the card 1 is supposed to be cut longitudinally, so as to show several of the perforations, all of those shown being in different transverse lines. This being the arrangement, as an arm 30 sweeps over the teeth 38, it depresses them all in turn, and whenever a perforation is beneath the stylus end of a tooth the latter is forced into contact with the bed or plate. The circuit then is momentarily closed, and an impulse in proper sequence transmitted. The block or bearing 39 of the comb is to be capable of a slight movement transversely in its bearings, whose limit will be equal to half the space between the members of a code. Then when the use of the first alphabet in a line is completed, the comb is shifted to be in position for use with the second alphabet of such line. The feed is effected as in the transmitter hereinbefore described. It is to be noted in this connection that hitherto in the

use of perforated paper to automatically control telegraphic transmission, a stylus has been used to effect contact with a metal plate or drum by dropping through the perforations a rapidly-moving fillet of paper, the dropping through being aided only by gravity or a very slight spring, and such styluses were naturally light and delicate, the result being that often but slight or imperfect contacts were made, while often, also, the action of the edges of the perforations in a rapidly-moving strip would give a bound to the stylus, causing it to miss entirely a perforation or two, especially if close together. *Per contra*, in this arrangement for each character there is a stylus, which is forced positively to the bed or plate to make good firm contact therewith, and during the operation of transmission of the symbols in a line the card and the bed are stationary, avoiding all chance of imperfect connections and missending of the symbols.

The reception of the messages at the receiving end of the line may be effected in any of the ways indicated in my application for Letters Patent hereinbefore referred to, or in any other suitable way, this feature forming no part of my present improvements.

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

1. A card, fillet, or strip for automatically controlling telegraphic transmission, having the symbols of the code marked thereon in indications of similar character arranged in transverse lines, in each of which they may follow one another in code succession and at varying distances from a fixed initial point or from the edge of the card or slip, substantially as hereinbefore set forth.

2. A card, fillet, or slip for automatically controlling telegraphic transmission, having the symbols of the code used arranged thereon in transverse lines, in each of which they may follow one another in code succession, substantially as hereinbefore set forth.

3. A mechanical translator consisting of a bed adapted to receive the card or slip, a slide guided and moving upon the sides of the bed and having a slot corresponding in size and contour with the transverse line of symbols on the card, and an index or scale at or near the edge of the slot, substantially as and for the purposes set forth.

4. A card-preparing apparatus comprising the combination of the card-holder, a punch or embossing-die lever movable transversely over the face of the holder and to and from the same, and feed mechanism connected with and intermittently operated by said lever to effect the forward feed of the card during the return of the lever to the point from which it started on its movement across the face of the holder, substantially as and for the purposes hereinbefore set forth.

5. In a device for preparing a card or slip with characters in transverse lines to control telegraphic transmission, the combination of a tray for receiving the card or slip, a lever capable of horizontal and vertical movement, a punch or die attached to and moving with the lever, an index or scale for indicating the proper position of the die or punch for any character, and a feed mechanism controlled by the lever and adapted to feed the tray and card a proper distance after the completion of each transverse line, substantially as and for the purposes hereinbefore set forth.

6. In a device for preparing a card or slip with characters in transverse lines to control telegraphic transmission, the combination, with a card-holder or tray provided with a ratchet, of a lever carrying and controlling a punch or die and arranged to operate upon the card in transverse lines, a pawl to engage the ratcheted holder attached to the lever by a friction-collar and operated thereby to effect the feed upon the backward movement of the lever, and stop-pins to limit the range of movement of the pawl, substantially as and for the purposes hereinbefore set forth.

7. In a transmitting apparatus, the combination, with an intermittently-moving controlling-card, having the code-symbols arranged thereon in transverse lines, of traveling contact operating or making mechanism movable crosswise of the card in a path transverse to the direction of movement of the same, substantially as and for the purposes hereinbefore set forth.

8. The transmitting apparatus comprising the combination, with the holder for the prepared card, of a movable contact-operating arm, contact mechanism operated thereby and controlled in making and breaking the circuit by the conjoint action of the said arm and the prepared card, and intermittently-operating feed mechanism for advancing the card-holder step by step in a direction at right angles to the transverse lines of symbols on the card, the arrangement being such that when the contact mechanism is in action the feed mechanism is at rest, and vice versa, substantially as and for the purposes hereinbefore set forth.

9. The combination, with the card-holder or tray supporting the prepared card, of a rotatable shaft, an arm or arms projecting therefrom and moving therewith, anvils or contact-blocks, one on each arm, supported by but insulated from the arms, and pins, one in each arm, adapted to make contact with the anvils or contact-blocks, and feed mechanism for intermittently advancing the tray, 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.