(No Model.) 2 Sheets—Sheet 1.

E. J. MALLETT.

AUTOMATIC TELEGRAPHY.

No. 343,044. Patented June 1, 1886.

Fig. 1.

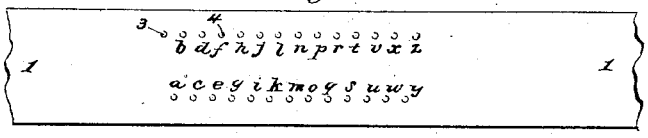


Fig. 2.

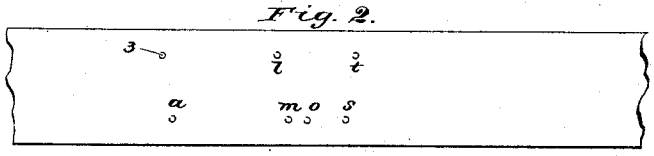


Fig. 3.

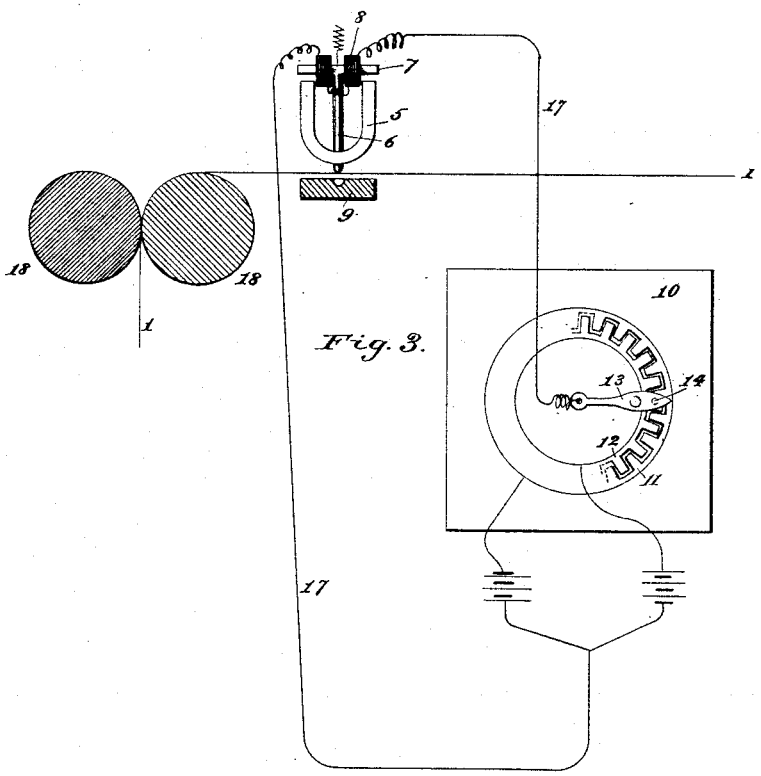
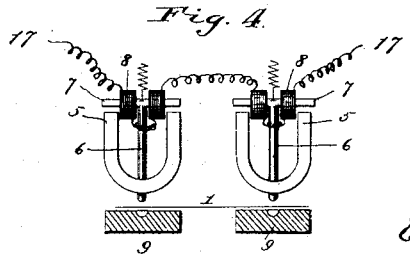


Fig. 4.



Witnesses:

H. N. Low

Walter Blandford

Inventor:

Edward J. Mallett

by Marcellus Bailey

his attorney

(No Model.)

2 Sheets—Sheet 2.

E. J. MALLETT.

AUTOMATIC TELEGRAPHY.

No. 343,044. Patented June 1, 1886.

Fig. 5.

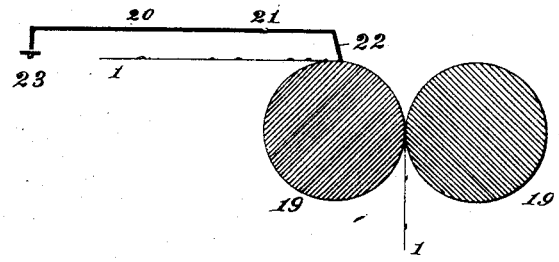


Fig. 6.

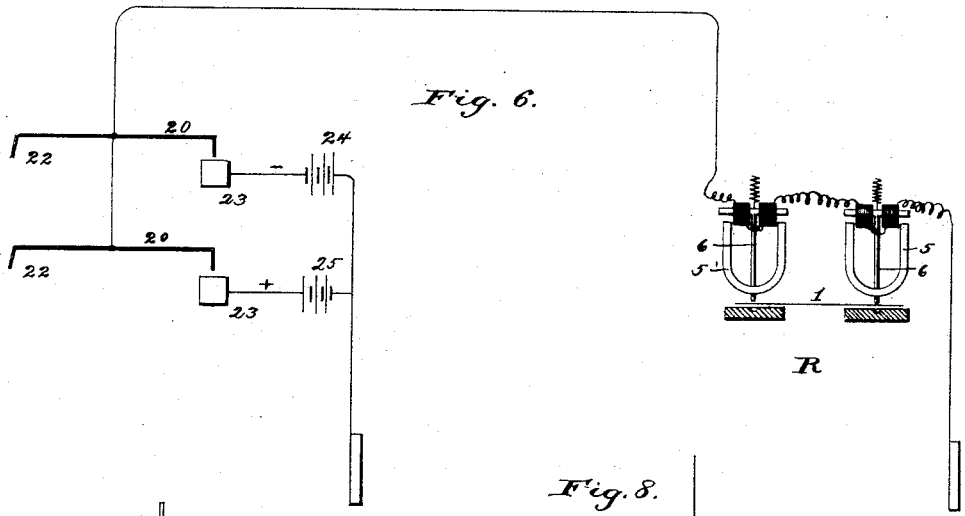


Fig. 7.

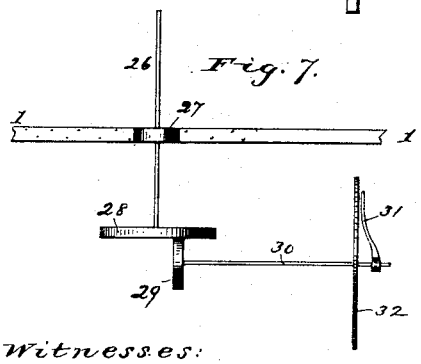
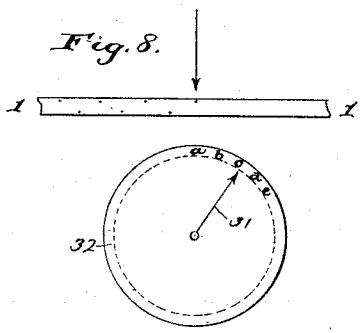


Fig. 8.



Witnesses:

H. N. Low

Walter 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 TELEGRAPHY.

SPECIFICATION forming part of Letters Patent No. 343,044, dated June 1, 1886.

Application filed January 8, 1885. Renewed April 30, 1886. Serial No. 200,739. (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 a new and useful Improvement in Automatic Telegraphy, of which the following is a specification.

In telegraphy as hitherto practiced the symbols of the code are formed by arbitrary groupings of long and short impulses or dots and dashes, each letter or symbol requiring on the average several impulses. This necessarily limits the speed of transmission and is a cause of the comparatively small amount of matter which an operator can transmit in a given time.

When it has been attempted to utilize automatic telegraphy to increase the speed of transmission and control the circuit by means of a perforated or embossed strip or fillet or paper, or by means of a prepared metal plate, the same cause has added largely to the labor of preparation of such circuit-controlling devices. To lessen the labor of such preparation and increase largely the speed of transmission, I base my system of telegraphy on a code in which each letter or other sign to be indicated is represented by but a single impulse or dot, the distance of this dot from a fixed or predetermined index or initial point determining its name or character—that is, the alphabet or code is formed of a series of equal short impulses or dots of regularly increasing distance from a fixed predetermined index or initial point, each impulse representing a letter or character and its meaning or name being fixed by its location. The use of such an alphabet requires means for the preparation of the circuit-controlling fillet, means for transmission of the message, means for its reception, and means for the translation of such received message into ordinary language. The characters or indications may be placed upon the fillet or strip, either by embossment thereon, the embossments being adapted to operate or control circuit-controlling keys, or by perforations therein, through which a stylus may make contact with a plate or drum to complete the circuit, and they may be arranged in a single line, so that the impulses sent shall all be of one polarity, or they may be in two lines, the impulses for the characters in one line being of one polarity, while those for the characters in the other line are of the opposite polarity.

As bringing an entire alphabet or code within the shortest possible length of fillet and as tending to ease of preparation and to rapid and quick clearing of residual charge from the line, I prefer to use alternating currents, the impulses for the successive letters of the alphabet or code being alternately positive and negative, and to emboss the dots upon the paper in their proper relative positions. This is readily accomplished by arranging two embossing-dies and molds so that they operate upon or toward the opposite edges of the fillet or tape. In such case, starting from the predetermined index-point, the successive embossed dots in one line upon or toward one edge of the fillet will represent *a c e g*, &c., while the embossed dots in the other line toward or upon the other edge will represent *b d f h*, &c., the members of this latter line or series of dots being opposite the spaces between the members of the first series or line. Simple means for the preparation of such an embossed strip or fillet consist of two polarized magnets, one arranged so that its armature responds to + currents and the other to — currents. These are placed so as to act upon or toward opposite edges of the band or fillet. The armature of each controls an embossing-punch adapted to take into a matrix or die the fillet or strip passing between the punch and matrix, so that upon the depression of the punch into its matrix the fillet is forced into the latter and an embossed or raised dot formed upon the fillet. To insure the action of one or the other of these polarized magnets at the proper time or interval upon the fillet, a simple key-board is used. Preferably this key-board consists of an insulated base, upon which are secured two series of segments, connected alternately to opposite poles of suitable batteries. An index-hand, provided with a suitable handle or knob for manipulation, is pivoted so as in its revolution to sweep over these two series of segments. It is connected to the line and is made slightly flexible, so that by pressure it may be caused to contact with any segment, the number of the segments corresponding to the number of arbitrary symbols to the code used. Rolls are used for drawing the fillet or paper beneath

the punches, the rolls being driven manually or in any suitable manner. These rolls and the index-hand are so rotated that while the index-hand makes one revolution or passage over the entire series of segments the paper shall be drawn by the rolls a distance equal to the space occupied by the entire code. These parts being thus arranged, in order to properly emboss the paper, it is simply necessary to depress the index-hand when it reaches the proper segment, or segment assigned to the desired letter, whereupon the circuit is closed through the polarized magnets, causing the proper one to depress its punch upon the fillet and into the matrix, forming an embossed dot at the point indicating or representing the desired letter or symbol of the code. With this form of embossed fillet a simple form of transmitter of the following description may be used: Two rolls of a width equal to or of slightly greater width than the fillet are journaled or mounted so that their peripheries closely approach each other. The shaft of one is geared to any suitable prime motor—such as a spring, weight, or electric engine—by which it is rotated at a regular speed. Between these rolls passes and is fed to the keys the embossed fillet, motion being communicated from the driven roll to the other roll by friction. The fillet passes beneath one end of each of two pivoted keys, whose outer ends are arranged to form contact with anvils connected, respectively, to the positive and negative poles of batteries or other sources of electric energy, while the keys are connected to the line. The keys are arranged so that each is over its own line of embossment on the fillet; hence as an embossment comes under the end of either key, it raises that end, depressing the other end, causing it to contact with its anvil, closing a circuit of the desired polarity to line. The message thus transmitted, if desired, may be received by any of the well-known chemical methods by the action of the current upon a solution in the receiving-fillet. In such cases, where alternating currents are transmitted, a chemical solution should be used in connection with two styluses of such character that one stylus marks with one polarity only, while the other marks with the other polarity only. Such combinations of styluses and solutions are well known in the art and need not be further particularized herein. I prefer, however, to receive magneto-mechanically by means, for instance, of devices consisting of two polarized magnets, punches controlled by their armatures, and matrices, as in the case of the means for preparing the fillet or strips for transmission, as before explained, rolls driven by any suitable prime motor being provided for passing the fillet at a regular rate of speed between the punches and matrices. The result at the receiving-station is a fillet embossed with dots, forming a fac-simile of the fillet used at the transmitting-station to control the circuit. It is not necessary that there be synchronism between the transmitting and receiving devices, inasmuch as the embossments or marks are to be translated and given meaning by their relative distances from the fixed and predetermined initial or index point; hence the only necessity is that of uniform or regular motion at each station, irrespective of its synchronism with motion at other stations. As the message thus received consists only of marks or embossments of uniform size, but of varying distances from the initial point, it cannot be readily translated at sight; hence means for its translation become necessary. These means may be simply a scale having the letters or signs represented by the code marked upon it by a scale determined by the speed of rotation of the receiving-instrument at the particular station. The fillet being then applied to this scale, or vice versa, the letters or signs meant may be readily seen. In practice a translator of the following general construction is desirable and efficient. A roll or pair of rolls driven normally or otherwise is provided for drawing along the received embossed fillet, and of such diameter that one revolution thereof draws along the fillet for a distance equal to the space occupied by an entire alphabet or code at the particular station. Adjustably geared thereto and driven therefrom is an index-hand, passing over an index plate or dial having marked upon it the alphabet or code. The gearing connecting the rolls and the index-hand is so adjusted that the rolls and the index-hand make one complete revolution in equal times. For this purpose the shaft of the roll or one of the rolls may carry at one of its extremities a flat-faced pulley, upon which takes the edge of a pulley attached to the shaft of the index-hand, the latter shaft being mounted in bearings, in which it may be moved so as to adjust its pulley nearer to or farther from the center of the face of the pulley on the shaft of the roll. The two may be thus adjusted so that their revolutions are synchronous throughout their entire movement. Being thus adjusted, as the fillet passes over a roll or between the rolls the hand will correspondingly move over the indications in the index of dial-plate. The operator seeing when an embossment or indication passes between the rolls or past some arbitrarily-designated index-point glances at the index-hand and dial-plate and sees thereon what letter or character is indicated, he being thus enabled, by visual inspection of the dial, to understand and translate the transmitted message. The means and methods thus generally described furnish a complete telegraphic system, capable of great speed of transmission, efficient and reliable in operation, and not requiring any great amount of technical skill or educated labor in its use. Its general arrangement and operation may be better understood by reference to the accompanying drawings, in which is shown a set of means adapted to carry the invention into practice.

Figure 1 represents the alphabetical code preferably used; Fig. 2, a piece of a fillet having part of a message embossed or indicated thereon; Fig 3, a view mainly diagrammatic of means for preparing the fillet; Fig. 4, a view of two embossing dies and matrices; Fig. 5, a side view of a single transmitting device; Fig. 6, a diagram of the circuit-connections for transmission and reception; Fig. 7, a top or plan view of a translator, and Fig. 8 a view of the received fillet and the index.

In Fig. 1, representing an alphabet or code, 3 is the fixed inital point, the distance relatively from which determines the character or meaning of any subsequent marks. The consecutive letters of the alphabet or code are there represented by dots or marks 4 of regularly gradually-increasing distance from 3. In order to save space and to utilize the benefits of alternating currents they are disposed in two lines, alternating consecutively, as shown in Fig. 1, the marks or indications in one line being opposite the spaces in the other lines.

In Fig. 2 is shown this alphabet practically applied to spell or indicate a record, the distance of the dots 4 to the left from the initial point 3 showing that they are the letters "a l m o s t." While these dots or indications may be made in any of the methods well-known in automatic telegraphy—viz: by perforating or embossing an insulating strip or embossing a metallic strip, or by marking in insulating ink upon a conducting surface—I prefer for ease and speed of preparation to use a fillet or tape with the indications embossed thereon. A simple yet sufficient means for such embossment, and in two paralled lines, is shown in Figs. 3 and 4. Therein 5 is a permanent magnet having an armature, 7, of soft iron, surrounded by a helix, 8, these elements forming a polarized magnet. To armature 7 is attached a post, 6, supported in and by the permanent magnet 5, and capable of vertical movement in its support, its outer end being rounded off or finished to act as a die and fitting into the concavity formed in a matrix block or anvil, 9, beneath it. The helix is stationary, and internally is made oval or of other suitable form, so as to permit to the armature 7, which it surrounds, the requisite play to and from the poles of the permanent magnet, said armature having the customary retractile spring, as indicated. When a current is sent through the helix 8, the armature 7 is attracted by 5, and moving thereto carries with it the die 6, forcing the fillet 1, passing between 6 and 9 into the concavity, and thereby forming a raised or embossed dot thereon. In using the double-line alphabet or code two of these are used, as shown in Fig. 4, the poles of the two permanent magnets being reversed relatively to one another, so that one armature only is attracted on the passage of a positive current through the circuit while the other is attracted only on the passage of a negative current. This arrangement of the elements of a polarized magnet for effecting the embossment is given typically. Other forms of such magnets may be used, it being requisite only that the parts shall be so arranged that each magnet acts only upon transmission of a current of appropriate polarity. The fillet is regularly fed between 6 and 9 by rolls 18, one of which is rotated manually or otherwise.

To determine the time of action of either die, and at the proper time, an electric circuit-closer is used, which may be of the style shown.

10 is any insulating-base, upon which are mounted the concentric conducting bands or rings 11 12. One of the peripheries of each of these is formed into projections or teeth of a space equal to the space occupied by or assigned to a signal or symbol in the code. The teeth or projections on one ring pass into and fill the spaces between the teeth or projections on the other ring, but without forming electrical contact therewith. One ring is connected to the positive pole of a battery while the other is connected to the negative pole of a battery. Pivoted upon the base 10 is the index hand 13, which is made slightly resilient or flexible. At its outer extremity it carries a contact-point, 14, which, on depression, may be caused to contact with any of the teeth of the rings, these teeth forming in effect segments equal to the number of characters in the code. This hand is connected in a circuit, 17, passing through the helices 8 8, and thence back to the batteries. This arrangement of the rings 11 12 and hand 13 forms a simple and efficient pole-changer or commutator.

To secure uniformity of rotation between 18 and 13, they may be geared together and both driven upon rotation of 13, which may be manually rotated, a knob or handle being fixed thereon for such purpose. The rolls 18 and hand 13 are so driven as to move with uniform speed, and so that 13 shall make one complete rotation over the face of 10 while the rolls 18 draw the paper fillet a distance equal to the space of an entire alphabet or code. If then the key 13 in its rotation be depressed and caused to contact with a segment, the circuit of one or the other of the batteries will be closed through the circuit 17, and one of the dies caused to operate, forming an embossed dot at the proper distance from the initial or index point to indicate the character or letter assigned to the segment contacted with a series of these embossed dots, representing a complete message, may thus be formed on the fillet and used to automatically control the circuit making and breaking devices forming the transmitter. A transmitter adapted to be controlled thereby is shown in Fig. 5, wherein 19 19 are rolls for feeding or passing the fillet 1 beneath the circuit making and breaking devices, said rolls, one or both, being peripherally grooved at the proper point, so as not to break down the embossments on the prepared fillet passing between them. One of these rolls is geared to and driven from any suitable prime

motor, so as to have a uniform rate of motion. 20 is a light lever-key, pivoted at 21 and having its inner end bent over into a stylus, which rests normally on or nearly on the periphery of one of rolls 19, its other end being formed into a contact-point adapted to take upon and close an electrical circuit at the anvil 23, but normally not in contact therewith. The paper fillet 1 being drawn through between a roll 19 and the stylus end 22 of the 20, the passage of an embossed dot beneath 22 lifts it, causing 20 to momentarily close circuit with 23 and transmit a single impulse to line, a succession of these operations sending the sequence of impulses in the proper relation to form the message. Where the double-line or alternating current alphabet or code is used, there are of course two such lever-keys, arranged parallel to each other at a distance apart equal to the distance apart of the two lines of embossment in the fillet. The arrangement of circuits therefor is shown in Fig. 6, where battery 24 is connected — to the anvil of one key, while battery 25 is connected + to the anvil of the other key, both keys being connected to line so that a + or — impulse is sent to line and the distant station as one or the other key is operated on. The signals thus transmitted may be received by the ordinary chemical decomposition processes used in automatic telegraphy, as before stated. I prefer, however, to have the message received by embossers of the same style as those heretofore described for preparing the original transmitting-fillet. Consequently there are arranged at the receiving-station R, Fig. 6, the embossers 5 6 and feed-rolls 18, as described in connection with Fig. 3.

The fillet used at the transmitting-station is reproduced at the receiving-station in the shape of a fillet having thereon the same points or embossments which are at the same relative distance from one another and from the fixed initial point as in the transmitting-fillet, but not necessarily at the same absolute or mathematical distances apart as in the latter, as, with regular speed at any station, the relative distances and not the absolute determine the meaning of the code points at that station. As the symbols thus received consist simply of dots at varying distances from the fixed initial-point, their meaning is not readily understandable on mere inspection; hence what may be called a "translator" is of utility. This may be a simple marked and graduated scale, in substance a duplicate of the alphabet or code shown in Fig. 1, or of any other code used, the relative distances apart of its members being determined by the space necessary for a complete code, which space is in turn determined by the rate of speed imparted to the receiving-fillet by the feed-rolls of the receiver. If such a scale be applied to the received message, so that the fixed initial points on the two coincide or register, the letters or characters intended on the received fillet will be immediately indicated.

Another form of translator—a mechanical visual one—is shown in Figs. 7 and 8. Upon a shaft, 26, is mounted a feed-roll, 27, taking in the ordinary way upon a friction-roll, (not shown,) between which rolls is passed, by the rotation of 27, the fillet 1, shaft 26 being geared to any suitable prime motor. The diameter of 27 is such that one complete rotation thereof feeds through a length of fillet just equal to the space occupied by the complete alphabet or code used. Upon the outer end of 26 is mounted a flat-sided pulley, 28, upon whose outer side takes the friction-pulley 29, adapted to be driven thereby by friction. 29 is mounted on a shaft, 30, upon whose outer end is fixed, by a friction sleeve or collar, the index hand or pointer 31, arranged to travel over the face of an index, 30, which is marked with the alphabet or characters represented by the code used. The train of gearing is so adjusted that the hand 31 and the roll 6 make one complete revolution in the same time, and travel synchronously together during their operation. To afford means for this adjustment, the shaft 30 is so mounted in its supports as to be capable of a longitudinal movement therein, and it is moved so as to carry 29 toward or from the center of 28 until 29 and 28 are in contact at just that distance from the center of 28 insuring this synchronism of movement between 6 and 31. The fixed initial point referred to is used as the "space" is used in the Morse code between words and wherever else it becomes necessary.

In transmitting it is agreed and prearranged that each message shall start from some predetermined point—a letter or other character in the code. When the translator is to be used, it is adjusted properly by using a fillet having this agreed-on starting letter or character as its initial point. The fillet is passed through, and when such agreed starting-letter reaches the roll 27 or some fixed index-point in its vicinity the hand 31 should point to such letter or character on 31. If it does not it is turned on its shaft until it does, for which purpose it is secured adjustably upon its shaft. These adjustments being made, the message-fillet is drawn beneath 27 by the rotation of the latter, caused by its motor 31 traveling over 30 synchronously therewith, and at a uniform rate so long as the rotation of 27 is unimpeded. The operator watching the feeding of the fillet beneath the roll 27, and seeing when an indication or symbol passes beneath the roll or past the fixed index-point in its vicinity, before referred to, by a glance at the dial-plate and index-hand, can ascertain the meaning of the indication or symbol, as the index at such moment points to the character represented by such indication or symbol, and the message is thus readily and easily spelled out or translated.

From the description given it will be seen that the methods and means noted form a novel system of telegraphy, having for its base a code whose signals are all formed by single

equal impulses, and which requires no educated or skilled labor in its practice.

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

1. The combination, in a telegraphic circuit, of circuit making and breaking devices, a transmitting fillet or ribbon for controlling the same having the code-symbols constituting the message formed thereon each as a dot or point of the same character arranged in one or more rows and at varying distances from one another and from a fixed initial point, whereby the value or designation of each symbol in any one row is determined by the position it occupies lineally in that row with respect to the fixed initial point, and receiving devices adapted to reproduce upon a fillet or ribbon the symbols in the same relative positions as in the transmitting fillet or ribbon.

2. A fillet for automatically controlling telegraphic transmission, having the symbols or characters composing the code formed each as a dot or point of the same character, but at varying distances from a fixed initial point arranged successively, alternating in lines upon or toward the opposite edges of the fillet—that is to say, arranged so that each symbol shall be located in a line opposite to that in which both the symbol that precedes and the symbol that follows it in code succession are located—substantially as set forth.

3. In apparatus for the preparation of the fillet for controlling the transmission in the system hereinbefore described, the combination, with an electro-magnetic embosser and an electric circuit therefor, of a circuit-controller consisting of segments or contact-blocks, one for each character or symbol of the arbitrary code determined upon, arranged in the same relation as the corresponding symbols of the code, a segment or contact block representing the fixed or predetermined initial point, and an index-hand arranged to pass over the segments or contact-blocks and to form contact with any desired one thereof on depression, substantially as set forth.

4. The translator for use in the herein-described system of automatic telegraphy, consisting of the combination, with the fillet-feed roll and the index-hand connected together to be synchronously rotated, of an index over which the hand passes having the characters represented by the symbols of the code arranged therein in the same relative positions and at the same relative distances apart as the symbols of the code, and a fixed initial point, whereby the meaning of the symbols upon the receiving-fillet are indicated upon the index, substantially as set forth.

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

EDWARD J. MALLETT.

Witnesses:

COLES W. WHITE,

JOSEPH S. STADDON.