No. 890,911. PATENTED JUNE 16, 1908.

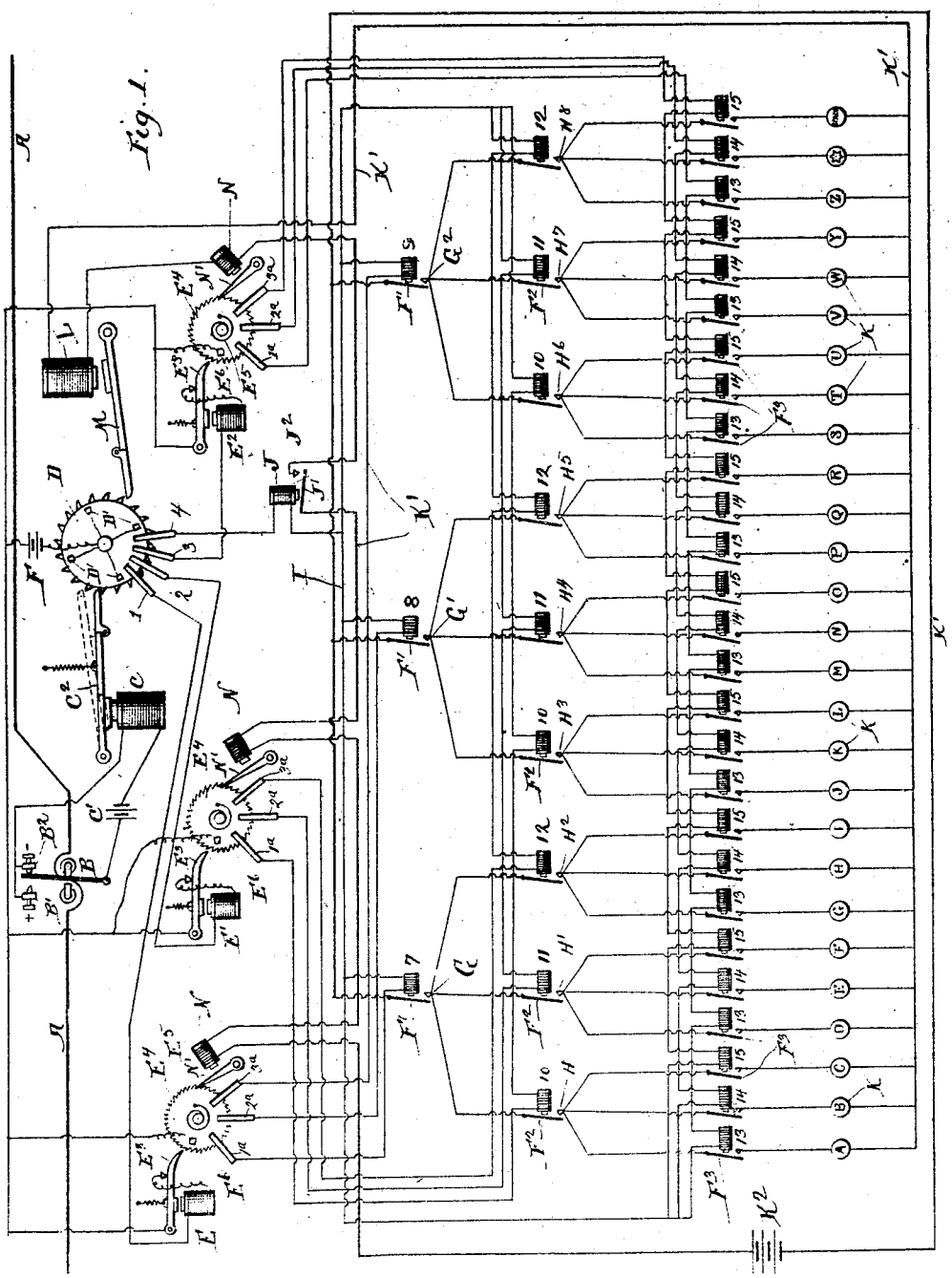
I. KITSEE.

PRINTING TELEGRAPHY.

APPLICATION FILED DEC. 19, 1905.

3 SHEETS—SHEET 1.

Fig. 1.



Witnesses:
Alvah Rittenhouse
Mary C. Smith

Inventor:
Isidor Kitsee

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3 SHEETS—SHEET 2.

Fig. 2.

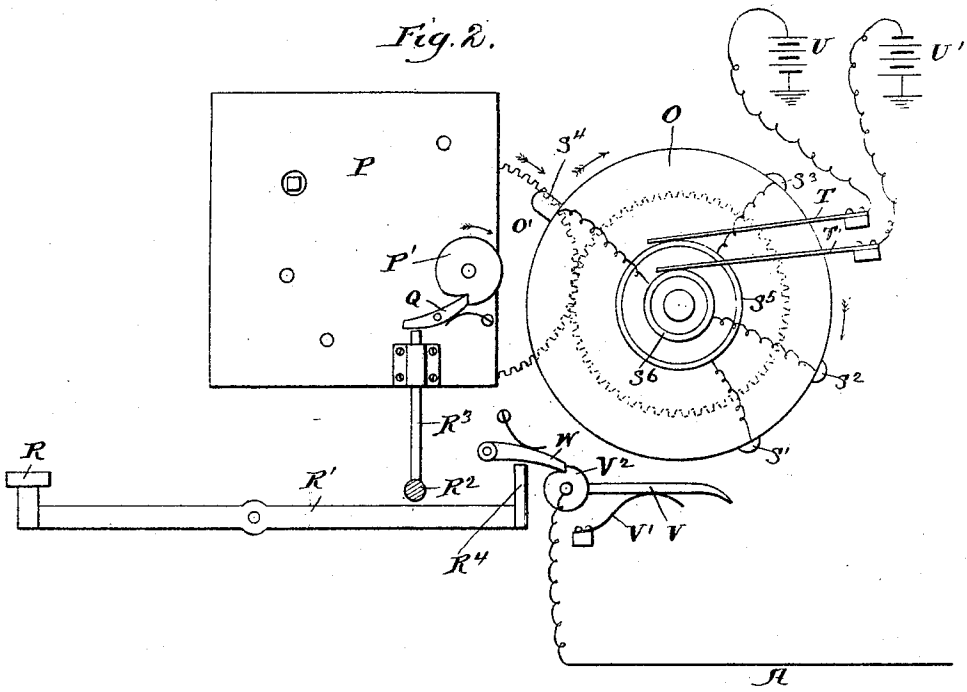
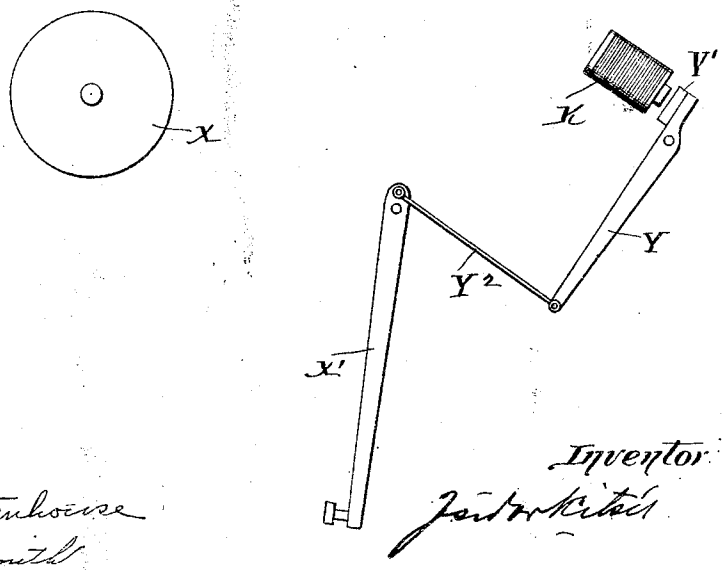


Fig. 3



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3 SHEETS—SHEET 3

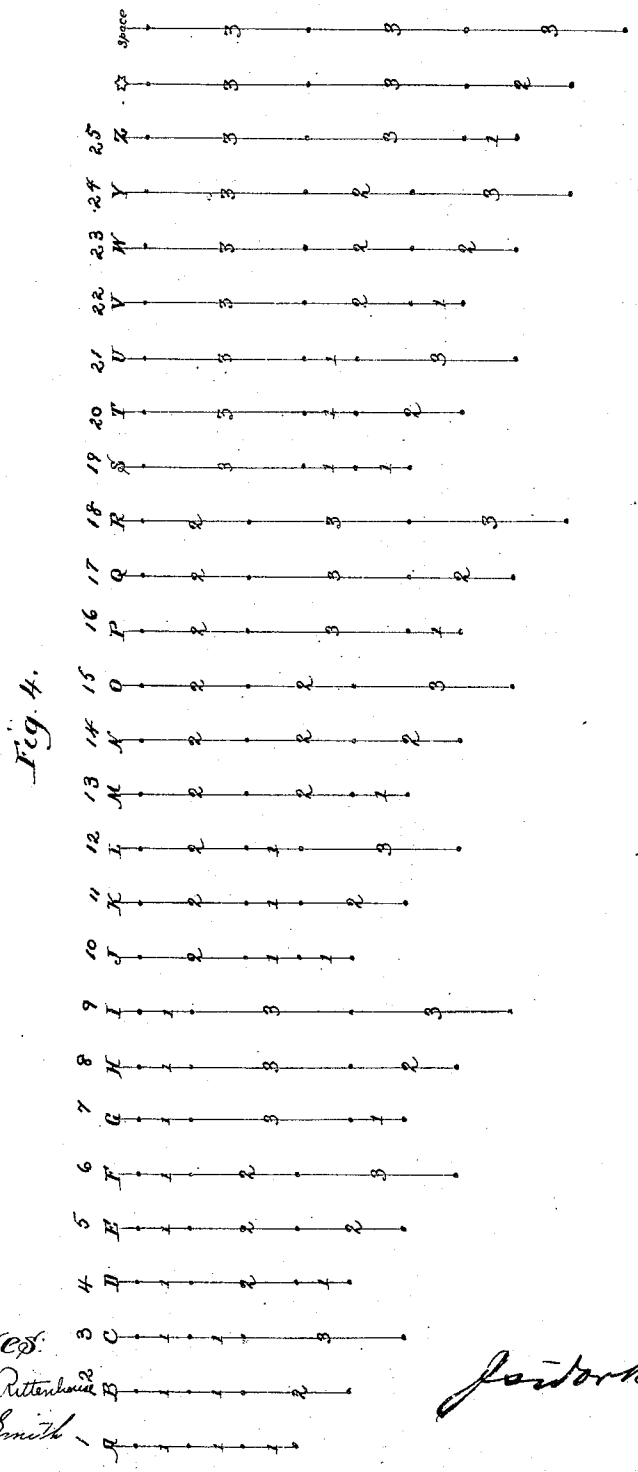

Fig. 4.

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UNITED STATES PATENT OFFICE.

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PRINTING TELEGRAPHY.

No. 890,911. Specification of Letters Patent. Patented June 16, 1908.

Application filed December 19, 1905. Serial No. 292,520.

To all whom it may concern:

Be it known that I, ISIDOR KITSEE, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Printing Telegraphy, of which the following is a specification.

My invention relates to an improvement in printing telegraphy. Its object is, to print the required characters with the aid of impulses sent over lines with comparative large capacity, such for instance as submarine cables. In organizing a system for such lines, it has to be taken into consideration that advantage cannot be taken of the different strengths of current nor of the different lengths of the impulse, for the reason that a large increase of strength is out of the question on such lines as submarine cables, and as such lines are usually provided with condensers and act in themselves as large condensers, an impulse impressed upon the line no matter for how long a time, will always actuate the receiving instrument in a manner as if this impulse would have been of short duration, for the reason that the condenser once filled will be a bar against the further flow of the same polarity. It has also to be taken into consideration, that to successfully work over a cable with comparative great speed, true reversals should always be impressed upon the line, that is, an impulse of one polarity shall always succeed an impulse of opposite polarity. When, therefore, neither the length of the impulse nor the strength of said impulse nor the polarity of same can be changed, so as to differentiate between the different sequence of impulses necessary for each character, the only available means are to differentiate by the greater or lesser time-unit elapsing between one impulse and the second impulse and I have in the arrangement availed myself of this method as later to be described. In such a system, it is advisable to have as a receiving instrument a so-called polarized relay, a device the armature of which rests always against one or the other of the stops and remains there till an impulse, opposite from the last impulse, compels the armature to leave its resting place and move towards the opposite stop. With such a device, it is possible to allow a local circuit to be closed for any desired length of time, even with an impulse of the very shortest duration and I avail myself of this device to produce results outlined herewith.

Referring to the drawings: Figure 1, is a diagrammatical view of the entire receiving portion of my improved printing telegraph machine; Fig. 2, an end elevation of the transmitter; Fig. 3, a side elevation of the platen, type-bar and means for operating the type-bar; Fig. 4, a diagram showing the alphabet and the manner in which the different impulses are sent in order that the proper magnets may be energized in the receiving mechanism to select the predetermined character.

In these drawings A represents the cable, it being understood that the return of this cable is the ground, but, of course, an all-metallic circuit is not excluded. The impulses sent over this cable are alternately positive and negative.

B is the armature of a suitable receiving instrument, caused to travel in one direction under a positive impulse and in the opposite direction under a negative impulse.

B′ and B^2 are two contacts adapted to be contacted by the armature as it moves backward and forward, both of said contacts are connected with one terminal of a magnet C, the other terminal of said magnet being connected to the armature B, in this circuit is included the battery C′, thus each time the armature B is oscillated, the circuit is opened and closed, and this movement will actuate an armature lever C^2 in one direction by the magnet C and in the opposite direction by a spring, as shown. Each time this circuit is closed, the lever C^2 is actuated and will operate upon a toothed-wheel D and move said wheel a distance represented by the distance between two teeth; this toothed wheel carries a contact point D′. In reality this wheel needs to be provided only with five teeth, because in this my arrangement, each character will be formed through four impulses, but in the drawing I have illustrated this wheel as to be provided with twenty teeth and four contact points, one contact point for each five teeth, for the reason that, mechanically considered, a large wheel which makes less revolutions stands wear and tear better than a smaller one with increased speed.

As stated, for each character to be printed, I impress upon the line four impulses and differentiate these impulses by the time elapsing between the impression upon the line of two impulses. Normally the arma-

ture is in contact with the contact point B^2, and the first impulse of the four representing a character will be positive, and therefore the first impulse of each series will move the wheel D one point, so that the contact point D′ will come in contact with the contact strip 1, and this will establish a circuit through the magnet E of the first step-by-step movement; then the next impulse will serve to rotate the wheel D another point and bring the contact point D′ underneath and in contact with the strip 2; this will establish a circuit through the magnet E′ of the second step-by-step movement. Then the next impulse in the same manner will bring the contact point D′ in contact with the strip 3, and this will establish a circuit through the magnet E^2 of the third step-by-step movement.

Each of the magnets E, E′ and E^2 are provided with armatures which are caused to move at a predetermined speed, and these armatures are secured to a pawl adapted to operate the ratchet-wheels E^4, and as these pawls will move a given number of times during a certain space of time, the distance the wheel E^4 will be rotated will depend upon the length of time between the impulses. These wheels 4 are rotated against the actions of springs E^5, pawls N′ holding the wheel E^4 against retrograde movement. Each wheel E^4 is provided with a contact point E^6.

As stated before, the difference in time between the four impulses impressed upon the line for each character determines which magnets shall be energized, and therefore what character shall be selected to be printed. There are three different variations that are made in the time between the impulses, and the shortest space of time will, of course, be the unit, therefore if the space of time between the first and second impulse is represented by one unit of time, the circuit through the magnet E and battery F will only be established long enough so that the wheel E^4 will move a sufficient distance to bring the contact point E^6 into contact with the strip 1^a, then the next movement of the wheel D, brings the contact D′ in contact with the strip 2, and will establish a circuit through the magnet E′, and if the space of time between the second and third impulse is equal say to two units of time then the wheel E^4 of the second step-by-step movement will be rotated a sufficient distance to bring the contact point E^6 in contact with the strip 2^a, and then upon the next or third impulse the contact point D′ will be in contact with the strip 3, and therefore the circuit will then be made through the magnet E^2 of the third step-by-step movement, and if the space of time between the third and fourth impulse is equal to three units then the wheel E^4 of this third step-by-step movement will be revolved a sufficient distance to bring its contact point in contact with the strip 3^a. Thus it will be seen that it depends upon the space of time between the first and second, second and third, and third and fourth impulse to determine which one of the three strips of each step-by-step movement will be brought into contact with the contact points E^6.

It will be seen by Fig. 1, that the contact strip 1^a of the first step-by-step movement is connected to the magnet 7, the second strip of this same movement being connected to magnet 8, and the third strip of this same movement connected to magnet 9. The first strip 1^a of the second step-by-step movement is connected to magnets 10 of the second series of magnets, the strip 2^a of the second movement is connected to magnets 11 of the second series, and strip 3^a of the second movement is connected to magnets 12 of the second series. The strip 1^a of the third movement is connected to magnets 13 of the third series, strip 2^a of the third movement is connected to the magnet 14 of the third series, and strip 3^a of the third movement is connected to magnet 15 of the third series. The other terminal of each of the magnets 7, 8, 9, 10, 11, 12, 13, 14 and 15 are connected to a return wire which extends to the strip 4 of the wheel D, and as the contact point D′ of the wheel D is connected to one terminal of the battery F, and as the other terminal of the battery F is connected to all of the contact points E^6 of the wheels E^4, when the contact point D′ comes underneath the strip 4 on the fourth impulse a circuit will be established through whatever magnets are connected in the circuit by reason of the contact points E^6 being underneath one of the three strips 1^a, 2^a or 3^a of the different step-by-step movements.

The first series of magnets consists of three magnets, each one of the three magnets being connected to a separate strip of the first step-by-step movement; the second series of magnets consists of nine and are divided into three groups of three each, all of the magnets of each group being connected to different strips of the second step-by-step movement; the third series of magnets consists of twenty-seven divided into three groups of nine magnets each, and the magnets of each group are connected to the three different strips of the three step-by-step movements, thus it will be seen that if the contact point E^6 stops underneath the first strip of the first movement, under the second strip of the second movement, under the third strip of the third movement, then when the circuit is established on the fourth impulse the magnet 7 of the first series will be energized, magnets 11 of the second series energized, and magnets 15 of the third series energized. Each of the magnets from 7 to 15, inclusive, are provided with armatures F′, F^2 and F^3, which are normally held away from the magnets by springs or other means, but when attracted toward the

magnets are adapted to come in contact with contact points, which in the first series are G, G′ and G², in the second series are lettered H to H⁸, inclusive. The contact point G which is adapted to be contacted by the armature of the magnet 7 is electrically connected to the armature of one magnet in each of the three groups in the second series, and the contact point G′ is also connected to one magnet of each of the three groups of the second series, as is also the contact point G². The contact points H to H⁸ of the second series are each connected to the armatures of three magnets of the third series, each contact point being connected to the armature of one magnet of each group, that is, each one of the contact points of the second series being connected to the armatures of three magnets lettered 13, 14 and 15, and each one of the contact points of the three series is electrically connected to one terminal of magnets K which serve to operate the type-bars, the other terminal of said magnets K being connected to the return wire, which return wire extends to one terminal of a battery K², the other terminal of said battery being electrically connected with the armatures F′ of the magnets 7, 8 and 9. Thus it will be seen that if the step-by-step movements were so actuated that the magnets 7, 11 and 15 were energized, then the current would flow from one terminal of the battery K² through the armature of magnet 7 to contact point G, through the armature of magnet 11 to contact point H′, through the armature of magnet 15 of the third series to the return wire, and thus the letter F will be printed and no other. This circuit in which the battery K is located is normally broken, and is only closed when the contact point D′ is upon strip 4 as the magnet J is included in the circuit in which are also included the magnets 7 to 15, inclusive, and when the magnet J is energized it will attract an armature J′ which will make contact with the contact point J², thus establishing a circuit from the battery K². Included in the circuit of the battery K² are also the magnets N and L, thus simultaneously with the printing of the character described, magnets N and I will be energized, the magnets N attracting toward them the armature pawls N′, releasing the ratchet-wheels E⁴, allowing the springs E⁵ to return these ratchet-wheels to their normal position, and the magnet L will attract the armature pawl N toward itself, and this armature pawl will revolve the wheel D still another point, bringing the contact point D′ out of contact with the strip 4, breaking all of the circuits, and the parts will then all be returned to their normal positions ready for the next four impulses, representing the next character.

In Fig. 4, I have shown a diagram which illustrates how the different units of time employed between each impulse can be made to select any one of the twenty-seven characters. It is to be remembered that the different spaces of time between the first and second impulse will determine which strip of the first step-by-step movement the contact point E′ is to contact, the space of time between the second and third impulse will determine which strip of the second step-by-step movement the contact point is to come in contact with, and the space of time between the third and fourth impulse will determine which of the three strips of the third step-by-step movement is to be contacted, and by the arrangement of the electrical connections between the armatures of the magnets it will be easily seen how the different characters are selected.

Any suitable means can be utilized for transmitting the message, the only stipulation being that said means shall send four impulses and the proper intervals of time shall elapse between each impulse, according to the key that is operated. There are numerous ways in which this can be accomplished, one of which is shown in Fig. 2 of the drawing, in which O consists of a roller which is adapted to be rotated at an even rate of speed through gearing O′ by a suitable motor P.

P′ is a one-toothed ratchet-wheel located upon the shaft of one of the wheels of the motor or upon the shaft of the roller 6 if desired; the motor is normally held stationary by a pawl Q which engages this ratchet-wheel P′.

R is a key representing one of the characters, this key being secured to a lever R′. When one of the keys is depressed, the lever to which said key is secured will strike a bar R² raising a plunger R³ which will remove the pawl Q from engagement with the ratchet-wheel P′ and the motor will start and revolve the roller O; after the roller O and therefore the ratchet-wheel P′ has made one revolution, the spring pawl Q will again engage the ratchet-wheel P′ and hold the parts stationary. The roller O has arranged upon its periphery twenty-seven sets of contact points, each set consisting of four contact points lettered S′, S², S³, and S⁴; the first and third contacts, or those lettered S′ and S³ of each set is connected electrically with the positive terminal of a battery U, and the second and fourth contacts of each set are electrically connected with the negative terminal or battery U′, the other terminals of both of these batteries being connected to the ground. These contact points S⁴ are connected to the battery through the agency of rings S⁵ and S⁶ and brushes T and T′.

V is a pivoted contact lever or brush; V′ is a spring which tends to press said contact lever toward the roller O; V² is a one-toothed ratchet disk secured to the letter V, and W is

a spring pawl engaging the tooth of this ratchet disk and normally holding the lever V out of contact with the roller O. There is one of these levers V for each character represented, or each set of contact points upon the roller O, and there is also one spring pawl W for each lever. When a particular key is depressed a lug R^4 upon the rearward end of the key lever will strike the pawl W and this particular character will raise the pawl and allow the spring V′ to press the lever in position to contact the contact points upon the roller, and as the lever V is electrically connected with one end of the cable A, and as the other end of the cable is grounded, each time a contact point passes the lever V an impulse will be sent over the wire, the positive and negative impulses alternating, and when the last contact S^4 strikes the lever V, this contact being longer than the others, it will press the lever V downward in such a position that the spring pawl W can engage the tooth of the ratchet disk V^2 and thus return the lever V to its normal position; the distance between the contact points upon the roller O will determine the different units of time between the impulses.

In Fig. 3, I have shown the simplest form of printing, X representing the platen similar to an ordinary typewriter; X′ the type-bar; Y a lever provided with an armature Y′ adapted to be attracted by one of the magnets K, and this lever Y is connected to the type-bar by the link Y^2.

I have in Fig. 4, as stated in the description of the drawing, illustrated a schedule of time-units, by which letters of the alphabet may be differentiated. I have not in this schedule taken into consideration,—as in practice it should be—the frequency with which certain letters are used in telegraphing, so as to characterize these letters by the shortest time-unit. But it is obvious that, as the arrangement outlined in Fig. 4 is only arbitrary, the time-units between the different letters may be changed.

It will be noticed that one of the characters following the alphabet is a star, such characterization is also arbitrary and instead of a star any other emblem may be substituted. The reason for this character is as follows:—To differentiate through four impulses the different letters and to be enabled to use the last impulse; as an impulse to return all receiving devices to their normal zero position, only twenty-seven characters could be secured, and as the numerals are not included in these twenty-seven characters, I have recourse to the following method:—To telegraph a numeral it is necessary to first send the impulse characterizing a star and then send at once, without any space intervening, a letter representing the numeral, for in this system each letter of the alphabet represents a numeral equal to the position of this letter in the alphabet; as for instance, A is equal to one; B to two; C to three; and so forth as is outlined clearly in Fig. 4. When the operator, therefore, wishes to transmit the numeral 2,516, he transmits first the impulse characterizing a star, then the impulse characterizing a Z, and then the impulse characterizing a P. From this description it is clear that with the arrangement, as is outlined, letters and numerals may be sent at will. I have in the drawing illustrated the magnets as step-by-step movements, but it is obvious, as only three differences in time-units are used, these time-units may be taken care of by ordinary electro-magnets working in a quick or sluggish manner.

Having now described my invention what I claim as new and desire to secure by Letters Patent is:

1. In submarine telegraphy the method of actuating a printing device at a receiving station, which consists in causing to be selected, through impulses of alike duration and intensity, following each other in unequal succession, the required printing type and causing through an additional impulse the receiving mechanism to return to its normal position.

2. In submarine printing telegraphy means to transmit impulses of the same duration and intensity but alternately of opposite direction and means at the receiving station to print for each three of said impulses received the desired character, in combination with means to return the receiving mechanism through an additional arrived impulse to its normal condition.

3. In submarine telegraphy means at the transmitting station to transmit a combination of three impulses, the impulses following each other in unequal succession, and means to transmit a fourth impulse apart from said three impulses, in combination with means at the receiving station to select and print the desired character through said impulses and return the mechanism to its normal position.

4. In printing telegraphy, a transmitting and receiving station, the transmitting station provided with means to transmit impulses following each other in unequal succession, the impulses of the same duration, and means to transmit one impulse apart from the first named impulses; the receiving station provided with means to select and print the desired character through the first named impulses and provided with means to return the printing mechanism to its normal position through the second named impulse.

In testimony whereof I affix my signature in presence of two witnesses.

ISIDOR KITSEE.

Witnesses:

ALVAH RITTENHOUSE,

MARY C. SMITH.