

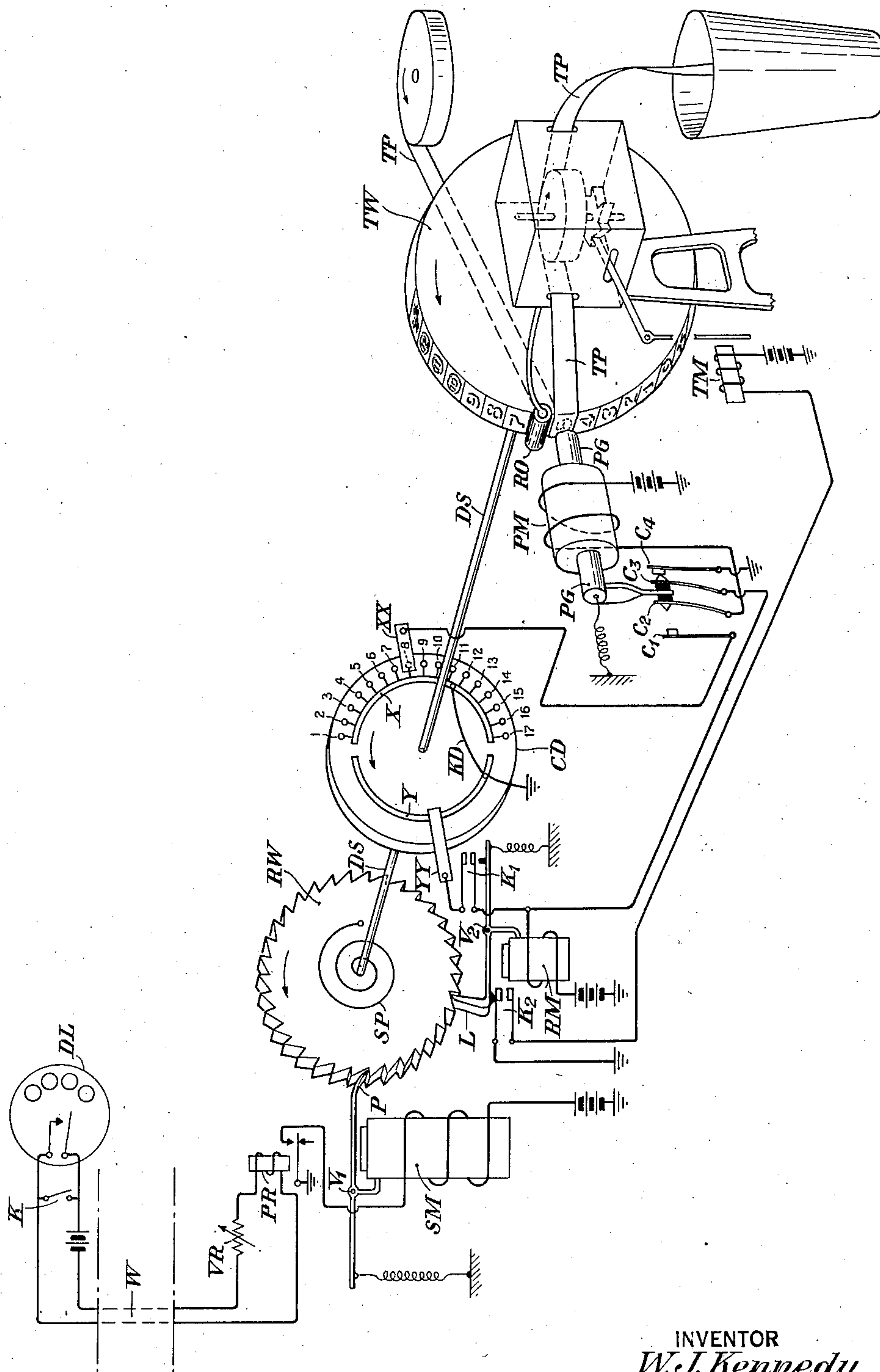
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W. J. KENNEDY

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CODE SIGNALING SYSTEM

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INVENTOR  
*W. J. Kennedy*  
BY *Jefferson Ehrlich*  
ATTORNEY



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## CODE SIGNALING SYSTEM

William Joseph Kennedy, Astoria, Long Island,  
N. Y., assignor to American Telephone and  
Telegraph Company, a corporation of New  
York

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This invention relates to signaling systems. More particularly, this invention relates to telegraph systems as well as other systems for transmitting signals in coded form.

In accordance with this invention signals may be transmitted from one station to another by means of groups of pulses. These pulses may be those produced by an ordinary or modified telephone dial. One group of pulses may be used to characterize one signal and a different group of pulses a different signal and so on. At the receiving station the received pulses may be employed to actuate a stepping mechanism which in turn controls printing apparatus including a type wheel. The stepping mechanism will be actuated a number of times corresponding to the groups of pulses received and the printing mechanism will print the character corresponding to each received group of pulses. The character may be printed on a tape or recorded in any other manner.

This invention will be better understood from the more detailed description hereinafter following when read in connection with the accompanying drawing showing one embodiment of the invention merely for the purpose of illustration.

Referring to the drawing, a transmitting station and a receiving station are shown connected to each other by means of a line W. The transmitting apparatus may include, among other things, a dial DL which may be or may resemble an ordinary telephone dial and a key K, both in shunt with each other. If desired the key K may be incorporated as part of the dial structure as will be explained hereinafter. The receiving station may include a relay PR which may be of the polar type, a stepping magnet SM controlled by the polar relay PR, and other mechanism controlled by the stepping magnet SM. The other mechanism may include a driving shaft DS upon which are mounted a ratchet wheel RW, a commutator disk CD and a type wheel TW. The wheels RW, CD and TW are keyed to the drive shaft DS and will be rotated as a unit about the driving shaft DS under control of the stepping magnet SM. The receiving station may also include a printing magnet PM having the usual type of plunger for impressing a character upon tape TP which moves in a space between the printing magnet PM and the type wheel TW. The printing magnet PM will also control a release magnet RM as will be explained hereinafter.

The stepping magnet SM when energized will attract its armature which is pivoted about the point V<sub>1</sub> and causes its operating pawl P to en-

gage one of the teeth of the ratchet wheel RW and thereby rotates the ratchet wheel RW as well as the commutator disk CD and the type wheel TW in a counter-clockwise direction with respect to the drive shaft DS. Each such operation of the stepping magnet SM may cause the ratchet wheel RW to rotate through an angle of, for example, ten degrees. Hence, if the stepping magnet is operated five times in succession in accordance with five pulses received in succession by the receiving station, the ratchet wheel may be rotated counter-clockwise through five steps or, for example, fifty degrees. The armature of the release magnet RM which is pivoted about the point V<sub>2</sub> carries a locking latch L which also engages the teeth of the ratchet wheel RW to hold the ratchet wheel RW in place after each step of its rotation.

The commutator disk CD comprises two continuous conducting segments X and Y which are electrically connected to each other by a conductor KD which is grounded. This continuous or solid conducting segment X is associated with a group of small point-like conducting segments designated 1 to 17, which are conductively connected to the continuous or solid segment X by radial lines or wires as shown. Two brushes XX and YY are also associated with the commutator disk CD and these are held in a stationary position by springs (not shown). The brush XX will make contact with the point-like segments 1 to 17 whenever the disk CD is rotated out of its normal position. In its normal position the two continuous conducting segments X and Y are insulated from the brushes XX and YY. Although the commutator disk CD is shown in one of its operated positions for illustrative purposes, nevertheless when the disk CD is in its released or normal position the brush XX will be spaced and insulated from point segment 1 associated with the continuous segment X. Also the other brush YY will normally be positioned between and insulated from the continuous segment Y and point segment 17 associated with the continuous segment X. Whenever the disk CD is rotated out of its normal position, it will cause the brush XX to progressively contact the various point segments 1-17 one at a time while brush YY will continuously contact segment Y. The grounded circuit established by brush XX will control the printing magnet PM. The grounded circuit established by brush YY will control the release magnet RM. This will be more clearly explained hereinafter.

Assume that the dial DL at the transmitting



station is operated to produce a series of D. C. pulses which, let us say, are eight in number. These pulses will be transmitted over the line W and through the rheostat VR at the receiving station to the winding of the receiving relay PR. When the first pulse is received, the relay PR will be operated and the closure of its contact will cause the stepping magnet SM to become energized. As the armature of the stepping magnet SM is attracted, its operating pawl P will engage one of the teeth of the ratchet wheel RW and cause the ratchet wheel to rotate through an angle of, for example, ten degrees. The locking latch L will act to hold the ratchet wheel in position after each operation of the stepping magnet SM. Each subsequent pulse received by the receiving relay PR will again cause the stepping magnet SM to operate and further advance the ratchet wheel RW through a corresponding angle. After the last of the series of pulses has been received, the brush XX will come to rest on segment 8 and the brush YY will contact the segment Y. The printing magnet PM will then be energized over a circuit which includes battery, the winding of the printing magnet PM, and the normally closed contacts C<sub>1</sub> and C<sub>2</sub> which are controlled by the plunger PG of the printing magnet PM, the brush XX, the point segment 8 and its associated continuous segment X, conductor KD and ground. It is to be noted that the printing magnet PM is of the slow-operate type and that it will be operated only after the commutator disk CD has come to rest at the termination of a group of received impulses. When the printing magnet PM operates, its plunger PG will be pressed against the tape TP which traverses the space between the plunger PG of the printing magnet PM and the type wheel TW, the type wheel bearing numbers or characters at its periphery and the number or character adjacent the tape TP will be printed thereon.

The advance of the plunger PG of the printing magnet PM from its normal position will open the path between the contacts C<sub>1</sub> and C<sub>2</sub> and soon thereafter close the path between the contacts C<sub>3</sub> and C<sub>4</sub>. This will cause the release magnet RM to be energized. The circuit for energizing the release magnet will include battery, the winding of the release magnet RM, contacts C<sub>3</sub> and C<sub>4</sub> which are closed by the advance of the plunger PG of the printing magnet PM and ground. When the release magnet RM operates it will be locked in its operated position over a circuit which includes the contacts K<sub>1</sub>, which are controlled by the armature of the release magnet, the brush YY, the continuous segment Y, and ground. The operation of the release magnet RM will also remove the locking latch L from engagement with the ratchet wheel RW, whereupon the ratchet wheel RW will be returned in a clockwise direction to its normal position under the influence of a spring SP. The commutator disk CD and type wheel TW, being positioned on the same shaft DS with the ratchet wheel RW, will also return to their normal positions. When the drive shaft mechanism is in its normal position, the brush YY will be disconnected from its associated segment Y and hence the locking circuit for the release magnet RM above described will be opened. The operating circuit for the release magnet RM which was previously completed by contacts C<sub>3</sub> and C<sub>4</sub> associated with the plunger PG of the printing magnet PM, will also be opened and hence the release magnet will

become deenergized and thereby allow the locking latch L again to engage the ratchet wheel RW. The operating circuit for the printing magnet PM will also be opened as soon as the brush XX is disconnected from its associated segment 8. The apparatus at the receiving station will now be ready to receive a second group of pulses from the transmitting station under control of its dial DL or key K.

It will be observed that the plunger PG, although insulated from contacts C<sub>1</sub> and C<sub>3</sub>, is mechanically fastened to these contacts. Contacts C<sub>1</sub> and C<sub>2</sub> are normally closed with the printing magnet PM in its normal or released position and contacts C<sub>3</sub> and C<sub>4</sub> are normally open. The printing magnet becomes energized only after the disk CD is moved from its normal position and comes to rest. The printing magnet in closing contacts C<sub>3</sub> and C<sub>4</sub> after it operates, causes the release magnet RM to operate to restore the apparatus to its normal position after the printing operation has been completed. This general cycle is repeated in response to each group of the D. C. pulses from the transmitting station.

It is to be noted that as the ratchet wheel RW rotates in a counter-clockwise direction under control of the stepping magnet SM, the latch L will be alternately depressed by the teeth of the ratchet wheel. However, both of the contacts K<sub>1</sub> and K<sub>2</sub> will be sufficiently spaced to remain open. These contacts will be closed only when the release magnet RM becomes operated. In other words, the contacts K<sub>1</sub> and K<sub>2</sub> will be open as long as the ratchet wheel rotates in a counter-clockwise direction and release magnet RM is unoperated, but these contacts will be closed only in response to the operation of the release magnet RM.

The drawing also illustrates an inking roller RO which may pass over the peripheral characters of the type wheel TW and supply ink to these characters for the printing operation. The source of ink is not shown.

The drawing also illustrates a tape magnet TM which is energized under control of the release magnet RM. When the release magnet is operated it closes contacts K<sub>2</sub> which complete a circuit for the tape magnet TM. The tape magnet will be employed to step the tape TP a predetermined distance in preparation for the next printing operation. The tape-stepping mechanism may be of any well known type.

The proposed arrangement is particularly meritorious because it may be used and operated by unskilled personnel and it provides a printed record of each message. As compared with teletypewriter arrangements it is lighter in weight and hence more easily portable, it is more economical and it requires very little equipment.

The apparatus may be used for transmitting intelligence by means of printed numerical codes, as already noted. These codes may correspond to words and phrases for which two and three digit codes are used, or they may correspond to the letters of the alphabet for which one and two character codes are used, or to figures for which the numerical characters used in the system are used, preceded, in this case, by the "#" sign. The system may be operated upon the basis that a comparatively small number of specially selected words, for example, approximately 1500 words, would suffice to convey virtually all necessary information in a particular field of activity. These selected words and phrases may be listed alphabetically opposite their numerical



equivalents in a small code book. In this code book the numerical code may also be listed numerically opposite the corresponding words or phrases.

In addition to the advantage of simplicity of operation, since it would not require an experienced operator to send a message accurately, the apparatus is arranged so that reception of the message would be automatic and in printed form. It has the additional advantage of secrecy, since the impulses would mean nothing if picked up by unauthorized parties and it would require a recording device similar to the one described herein to reproduce the message. To translate the numerical codes as received, would require the possession of a code book similar to the one currently in use.

The sending apparatus and the receiving apparatus, although shown and described as connected to a wire circuit W, may be associated with each other by a radio line. The system will operate as described but a modified system, to be described, may be employed if so desired.

The sending unit consists principally of a dial such as is used in the telephone art. The dial DL may be arranged to accommodate, for example, fifteen finger holes around its circumference. Also, the space between the first hole and the finger-stop may if desired be made equal to the space of three finger holes. This will permit the dial to transmit an extra final pulse after the series of pulses normally sent for the particular character are transmitted. Such a dial structure would cause two pulses to be transmitted when the first character is dialed and sixteen pulses when the fifteenth character is dialed. Fifteen holes would be required in the dial in order to select any one of the fifteen type characters mounted on the type wheel TW of the printing mechanism. The first pulse transmitted by any hole of the dial would be a preliminary pulse used to advance the type-wheel past its first or blank position. The final pulse is the one which actually sets the type-wheel in its final position to print a selected character. The dial DL may be under control of a governor (not shown) which will cause it to send out the dial pulses at an even rate of speed.

Mounted upon or within the dial DL of the sending unit may be the telegraph key K. On the momentary operation of the spacing key K, a single impulse will be transmitted for the purpose of moving the type wheel to its first or blank position. Upon the operation of the printing magnet PM in the receiving unit, the type-wheel will return to normal and advance the paper tape TP the space of one character, thereby leaving a blank space on the tape, no type-character being in position on the type wheel TW to be printed. Thus a space may be provided between characters or groups of characters.

The codes used in the system may be made up of combinations of the fifteen characters which would appear on the dial device DL under the fifteen finger holes and also on the fifteen printing positions of the type-wheel TW. These characters may be arranged in the following sequence:

+ 0 1 2 3 4 5 6 7 8 9 @ ⑩ ⑪ #

On the first hole of the dial DL and on the first printing position of the type-wheel TW there may be the + character. From the second to eleventh holes there might appear the ten

digits 0 to 9. At the twelfth, thirteenth and fourteenth holes would appear the three characters 10, 11 and 12 each enclosed within a circle. The circle would identify these numbers as distinct characters so that they would not be understood as two of the digits. On the fifteenth hole would be the "#" sign, which may have a special purpose.

In formulating the numerical codes for words selected to be used for a particular field, the most frequently used words might be assigned two digit codes (such as 40 for the word "is") and likewise all other words selected for use in the system might be assigned three digit codes (such as 003 for aviation). The dial may be arranged as follows:

+ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z #  
0 1 2 3 4 5 6 7 8 9 ⑩ ⑪ ⑫ #

In such a standardized system, words beginning with A or B may have a two or three digit code beginning with 0, as 01 for "ammunition" or 050 for "battery." Likewise words beginning with R may have a code beginning with 8 and words beginning with W would have a code beginning with ⑩. Any such combinations may be provided to constitute the codes.

Although the dial DL may be of a special type somewhat different from a telephone dial, it will be understood that a telephone dial may be used in the practice of this invention if so desired. In fact the dial device DL may be any form of pulsing apparatus well known in the art.

Although this invention has been shown and described in certain particular embodiments merely for the purpose of illustration, it will be understood that the general principles of this invention may be applied to other and varied organizations without departing from the spirit of the invention and the scope of the appended claims.

What is claimed is:

1. In a signaling system, the combination of means for producing a plurality of D. C. pulses, a type wheel having peripherally arranged characters, a ratchet wheel, a commutator disk mounted on a shaft in common with said type wheel and said ratchet wheel, means responsive to the direct current pulses for engaging said ratchet wheel and rotating it step-by-step through an angle corresponding to the number of D. C. pulses produced, printing mechanism adjacent to the type wheel and controlled by said commutator disk for printing the character on the type wheel which is adjacent to the printing mechanism, and means controlled by the printing mechanism to return the type wheel to its original position after the printing operation is completed.

2. In a signaling system, the combination of means for producing groups of pulses of current corresponding to different characters, a rotatable type wheel having characters mounted on its periphery, a ratchet wheel, a commutator disk mounted on a shaft in common with said type wheel and said ratchet wheel, means responsive to said pulses of current to engage said ratchet wheel and rotate said ratchet wheel, said commutator disk and said type wheel step-by-step from their normal positions, printing mechanism adjacent to said type wheel, means controlled by said ratchet wheel for operating said printing mechanism, and means controlled by said printing mechanism for returning said type wheel to its normal position.

3. In a signaling system, the combination of



means for producing groups of pulses of current corresponding to different characters, a type wheel, a ratchet wheel, a commutator disk mounted on the same shaft as said ratchet wheel and said type wheel so that said wheels and disk may rotate as a unit, a printing magnet adjacent the type wheel, means for feeding tape between said type wheel and said printing magnet, means responsive to said pulses of current to engage said ratchet wheel so as to rotate said ratchet wheel, said commutator disk and said type wheel step-by-step, and means controlled by said commutator disk to operate said printing magnet and to return said type wheel to its normal position.

4. The combination of means for producing a series of equal pulses in regular order, a type wheel, a disk having a plurality of peripheral contacts, said disk being mounted on a shaft in common with said type wheel so that said disk and said wheel always are in the same relative angular positions with respect to the common shaft, means responsive to said pulses to drive said shaft by an amount which corresponds to the number of pulses produced, printing mechanism adjacent said type wheel, means including

5 a circuit interconnecting the peripheral contacts of said disk and said printing mechanism to operate said printing mechanism after the last pulse has been received, and means controlled by said printing mechanism to restore the shaft to its normal position.

10 5. In a signaling system, the combination of a dial-controlled device for producing groups of pulses corresponding to different characters, printing mechanism including a type wheel, a commutator disk, a ratchet wheel mounted on a common shaft with said type wheel and said commutator disk, means including a stepping magnet having an armature in engagement with said ratchet wheel and responsive to said pulses to rotate said wheels and said disk step-by-step about their shaft through an angle determined by the number of pulses in a group, means controlled by said commutator disk for operating said printing mechanism after the last pulse of the group has been produced, and means responsive to the operation of said printing mechanism to return said wheels to their normal positions.

25 WILLIAM J. KENNEDY.