Jan. 28, 1941. T. A. McCANN 2,230,081

PRINTING TELEGRAPH COUNTING APPARATUS

Filed Aug. 16, 1938 3 Sheets-Sheet 1

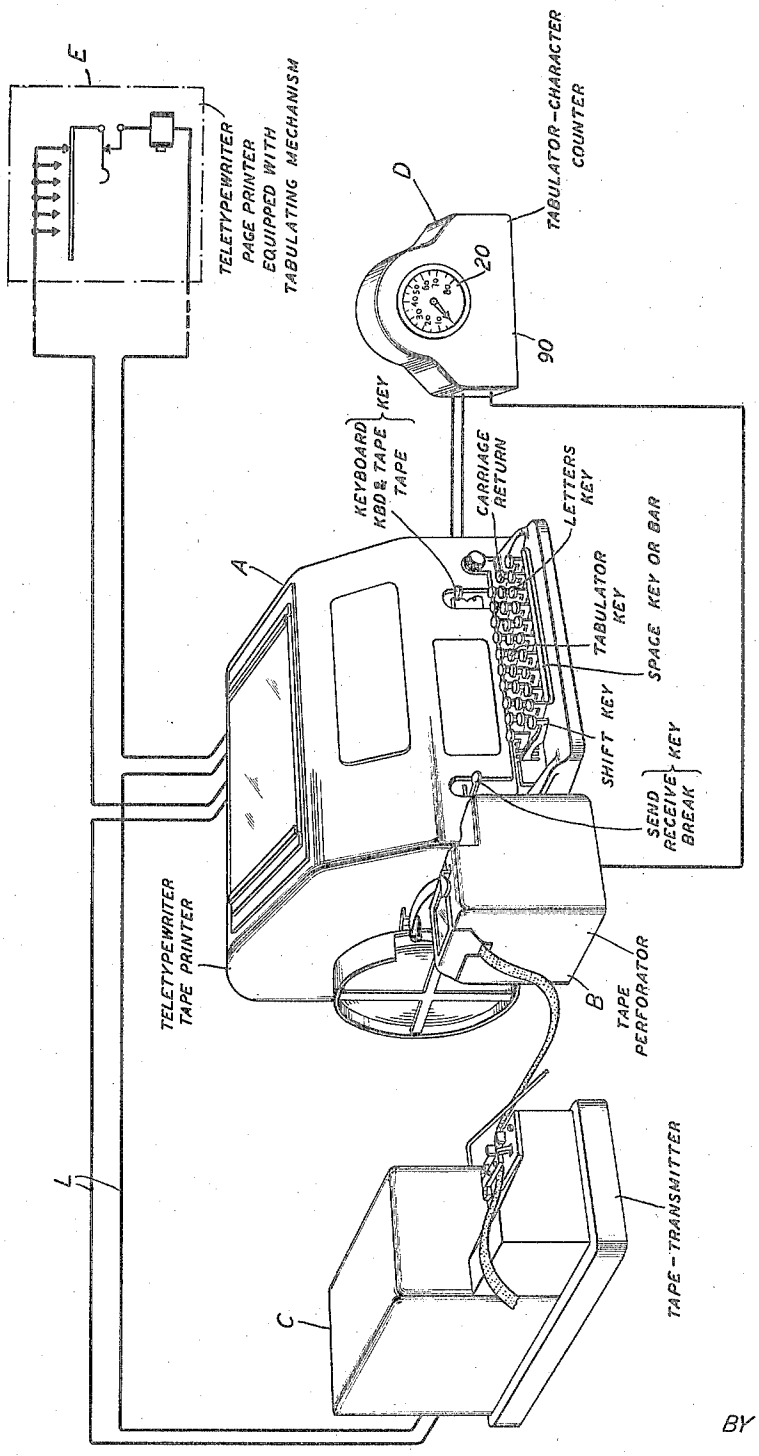

FIG. 1

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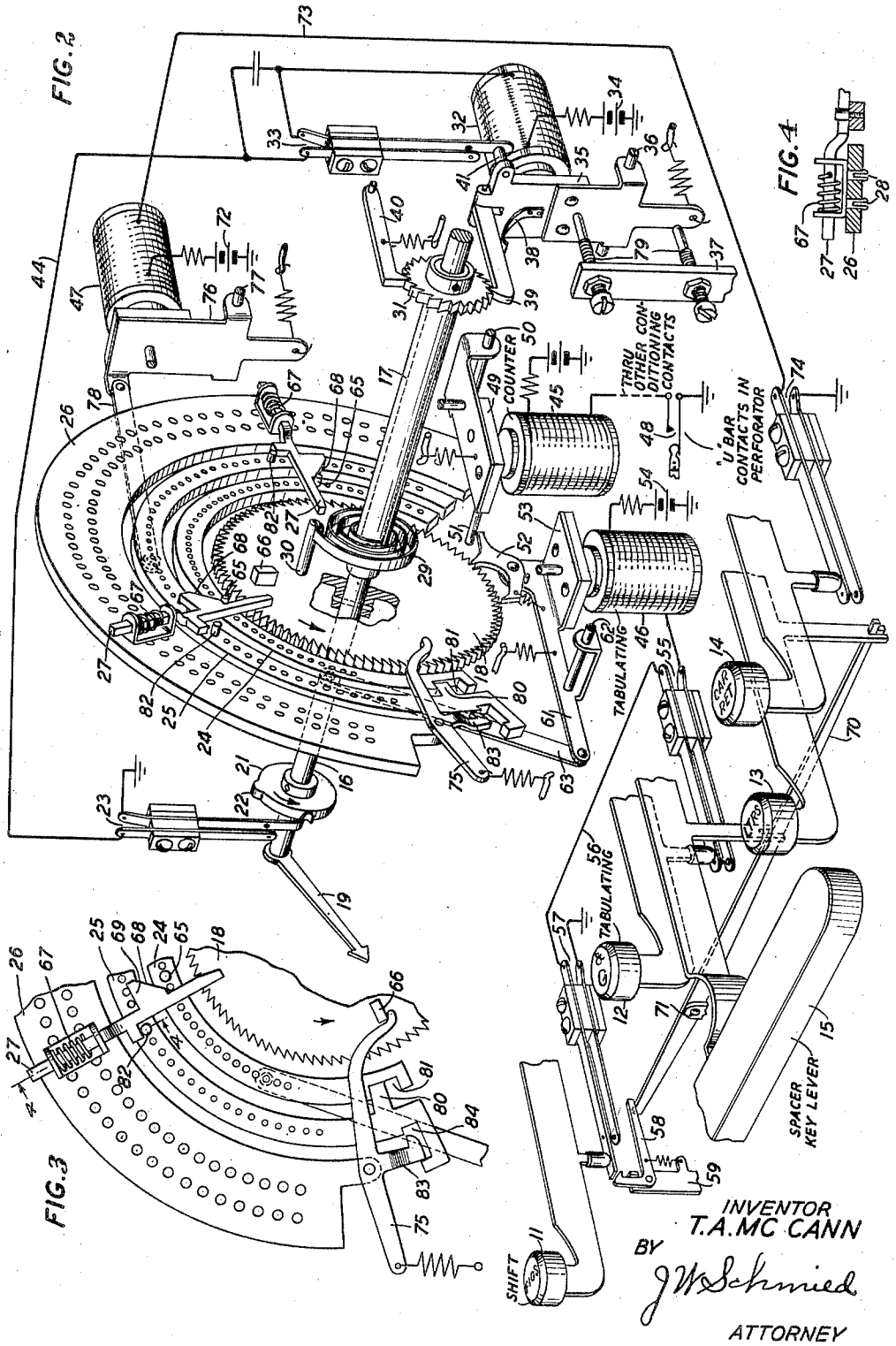

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Filed Aug. 16, 1938 3 Sheets-Sheet 3

FIG. 5

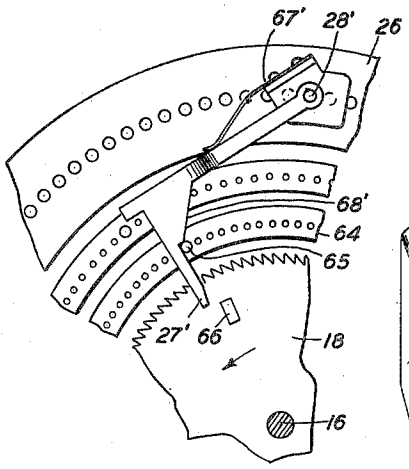


FIG. 6

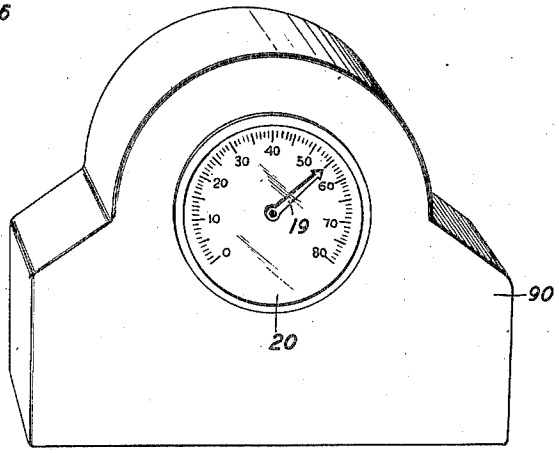
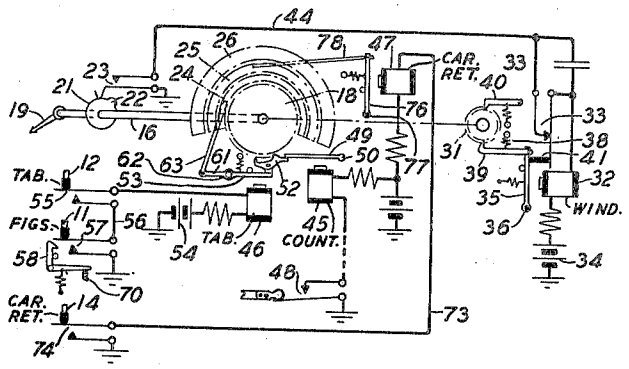


FIG. 7.



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Patented Jan. 28, 1941 2,230,081

UNITED STATES PATENT OFFICE

2,230,081

PRINTING TELEGRAPH COUNTING APPARATUS

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Application August 16, 1938, Serial No. 225,091

19 Claims. (Cl. 178—2)

The present invention relates to printing telegraph apparatus and more particularly to improvements in tabulating mechanism therefor. More specifically, the invention relates to indicators and particularly to indicating mechanisms for use with key-controlled apparatus.

An object of this invention is to indicate a count of the printing and the spacing functions in each line of a message being perforated in a tape for transmission, performed by the operations of the printing, the spacing and the tabulating mechanisms of a keyboard perforator-transmitter.

Another object is to provide facility for preparing an accurate record of a perforated tape without requiring a typed record on an organized form sheet before the transmitting operator, or the automatic control of a tape transmitter employed in transmitting to a remote point where the transmitted information is recorded on an organized form sheet such as is used for shop orders, invoices, bills of lading, etc., in intercommunication systems.

Still another object is to provide a character counting device for use with a keyboard perforator-transmitter, which is equipped for counting characters, isolated spaces and consecutive spaces of one or more groups in a line of a message that is to be recorded at the receiving end by a page printer.

Still another object is to count characters, isolated spaces and groups of consecutive spaces in every line of a message on a device that is operative independently of the code selecting bars and the type carriage of a teletypewriter machine.

Still another object of the present invention is to provide a counter for a keyboard perforator; one that will relatively show at all times during the perforating operation the exact position of every character and every space in each line of a message and the total number of characters, isolated spaces and spaces of a group predetermined for each tabulating signal in each line as they are produced as perforations on a tape.

Still another object is to enclose the tabulating character counter mechanism in a unitary structure that may be detachably connected to the housing of a keyboard perforator at the transmitting end of a communication line.

The tabulating function of the typing unit is effected through the medium of a code selector function lever associated with the selecter vanes which operate a type bar. The linkage associated with the function lever is a tabulating bar which extends across the front of a typing unit of a teletypewriter machine and which is pivotally carried by brackets and is capable of swinging toward and away from the type carriage. The tabulating bar carries a number of adjustable stop members which determine the position at which the type carriage comes to rest after selection of a tabulating function. The spacing mechanism of the printing apparatus comprises a three-toothed ratchet adapted to cooperate with a pair of pawls which are actuated by the printing bail to function as an escapement mechanism so that upon each revolution of the main shaft, the spacing worm gear associated with the spacing bracket is permitted to rotate one-third of a revolution. Thus by moving the adjustable stop members to any desired position the type carriages at both the transmitting and the receiving printers may be moved for any stop member any number of consecutive spaces in one operation. For a more detailed description of the tabulating function, reference may be made to United States Patents 2,023,121 and 2,076,864, respectively granted to C. W. Burcky et al. on December 3, 1935, and to Albert H. Reiber on April 13, 1937. In neither of these patents is there disclosed a counter for recording the total number of characters, isolated spaces and consecutive spaces of groups that may be contained in a line of a perforated tape message intended for recording on a page printer at the local or distant end.

According to the present invention the tabulating indicator is provided with a keyboard perforator to indicate at all times the relative position of the type basket with respect to the left-hand margin of the perforated material which will later be recorded on a page printer at the receiving, or distant, end. The use of a tabulating indicator makes it unnecessary for the perforator operator to have a page printer record of the message that is being perforated for subsequent transmission. By this means the operator is provided with facility for rapidly perforating tape and is not limited in speed of perforation by the operating speed of a monitoring teletypewriter which would otherwise be required. The tabulating indicator comprises a spring driven pointer ratchet wheel which carries the indicator pointer. The ratchet wheel spring is kept wound by an electromagnet in a buzzer, or pulsing, circuit. Three magnets, namely the counting, the tabulating and the carriage-return magnet are provided to release the pointer ratchet wheel and allow the pointer

to advance under action of the spiral spring in accordance with the functions perforated in the tape. The counting magnet is connected the same as that in the end-of-line indicator disclosed in United States Patent 2,018,368, granted to R. A. Lake on October 22, 1935, so that it operates on all except non-spacing functions. The tabulating function controlled by the tabulating magnet, is normally selected on upper case "G." It is necessary in using the tabulating indicator to arrange a set of contacts to be closed by the shift key lever and locked in a closed position. These contacts are connected in series with another set of contacts under the tabulating key lever. A trip latch is actuated by the spacing and "Letters" key levers to release the contacts under the shift key lever. In this way the tabulating magnets will receive an impulse only when the tabulating function is selected. It will not receive an impulse when the "G" key is selected without a preceding operation of the "Fig." key to record a shift signal. The carriage-return magnet is energized through a pair of contacts which are closed by the carriage-return key lever. When the pointer ratchet wheel completes a revolution a cam provided on the pointer ratchet wheel shaft closes a pair of contacts in a self-interrupting circuit for operating the winder electromagnet like a buzzer until the pointer ratchet wheel spring is completely wound for the start of another line of the message to be transmitted.

The proposed tabulating indicator may be applicable to systems employed by private organizations wherein it is desired to transmit orders, invoices, bills of lading, or the like, between branch houses, manufacturing centers and warehouses within the organization. In other words, among its applications are systems generally identified as intercommunicating teletypewriter systems. The tabulating indicator is particularly adaptable for systems wherein the transmitting is automatically done by means of a perforated tape and the receiving is had on a page printer. In systems of this character it is very often necessary that the transmitting operator must perforate tape "blind," that is, without the use of a monitoring teletypewriter by which the message may be checked. With the use of the tabulating indicator the transmitting operator, while perforating a transmitting tape, is informed of the number of spaces the signal just perforated is from the beginning of each line of a message which is to be subsequently transmitted to a page printer at a distant station.

The above and other objects of this invention will be fully set forth in the following description and claims, and will be more readily understood by reference to the accompanying drawings in which:

Fig. 1 is a schematic arrangement of a teletypewriter system wherein is shown a perspective view of a keyboard perforator and a tape transmitter connected with a transmitting and receiving printer similar to the one disclosed in U. S. Patent No. 1,745,633, issued to S. Morton et al. on February 4, 1930, together with a showing of an indicator which embodies the features of the present invention.

Fig. 2 is a fragmentary perspective view of the operative structure of the tabulating indicator;

Fig. 3 is a detailed view of the locking arrangement for the corresponding part shown in Fig. 2;

Fig. 4 shows the manner in which the tabulating stop members are adjustably mounted;

Fig. 5 is a fragmentary view showing a modification of a tabulating stop member employed in Fig. 2;

Fig. 6 is a perspective view of the tabulating indicator of a completed product, less connecting cord and contacts associated with the keyboard;

Fig. 7 is a schematic arrangement of the operating circuit employed in the tabulating indicator.

Referring to Fig. 1, the letter A designates a transmitting and receiving tape printer; letter B, the tape perforator controlled by the keyboard shown in front of printer A; letter C, a tape transmitter; and letter D, a tabulator and character counter. The transmission line L is connected to both the tape transmitter C and the transmitting contacts (not shown) of the tape printer A in order that the transmission of signals over the line may be either from the tape transmitter C or the printer A. If from the printer the transmission will be direct from the keyboard to the line and if from the tape transmitter, the transmission will be from the keyboard to the tape perforator, then from the perforated tape and tape transmitter to the line. The change from one form of transmission to the other may be effected by means of a key on the printer. The key commonly called "the keyboard, keyboard and tape, and tape" key is well-known in the art and is illustrated in a copending application of K. E. Fitch, Serial No. 180,075, filed December 16, 1937. The line L extends to a remote point where it terminates in a transmitting and receiving page printer E of the type disclosed in U. S. Patents 2,023,121 and 2,076,864, supra, which is equipped with tabulating mechanism.

Referring to Fig. 2, the numerals 11, 12, 13, 14 and 15 represent certain key levers of a keyboard perforator-transmitter, the base casting, cover and key set for which is shown in Fig. 1. Reference characters 11, 12, 13, 14 and 15 respectively indicate the shift key, the tabulating key which is usually the upper case "G" key but may be any other key, the "Letters" key, a carriage-return key and a space key, or bar. These keys together with the remaining keys, shown in part in Fig. 1, control, in addition to their usual functions, the operation of a rotatable shaft 16, which is suitably supported by the base structure. Frictionally mounted on shaft 16 of the indicator is a tubular sleeve shaft 17 which also is rotatable. Fixedly mounted on shaft 16 is a main ratchet wheel 18 and at the end of shaft 16 is an indicator pointer 19 arranged to rotate over a graduated scale on dial 20 shown in Fig. 5. Also frictionally mounted on shaft 16 is a cam 21 having a projection 22 arranged to close contact 23 when ratchet wheel 18 rotates to a point at the end of its revolution. Concentrically mounted with ratchet wheel 18 and arranged to rotate in either direction are tabulating stop ring 24 and carriage-return ring 25. In each of rings 24 and 25 is a circular row of apertures corresponding to the maximum number of characters that may be recorded in a line of a message that may be recorded on a page printer. Rings 24 and 25 may be rotatably supported in any suitable manner. They may be frictionally mounted at their rear sides to brackets (not shown) which, in turn, are frictionally mounted to collars (not shown), the collars being mounted adjacently to each other on shaft 16 at points intermediate to ratchet wheel 18 and cam 21. These rings may also be rotatably mounted in grooves on a

fixed plate 26 in a manner as employed for certain rings in a rotary telegraph distributor. Likewise, these rings may be mounted in any other of a number of obvious ways, it being understood that their method of being mounted is not restricted to any of the methods cited herein. The rings are rotated independently of the rotation of shaft 16 and in a manner to be hereinafter described. The fixed plate 26 is provided with two concentric circular rows of apertures for securely holding one or more tabulating stops in any desired position. The number of apertures in each row on fixed plate 26 corresponds to the number of apertures in the rings 24 and 25. The two rows in plate 26 serve to securely support by means of push fit studs 28 the tabulating stops 27 in a manner shown in Fig. 4.

The tubular shaft 17 which is rotatably mounted on shaft 16, has fixedly mounted on one end and at a point in close proximity to ratchet wheel 18, one end of an involute coil spring 29, the other end of the coil spring being secured to a pin 30, which is fixedly attached to ratchet wheel 18. Fixedly mounted on the opposite end of tubular shaft 17 is ratchet wheel 31 which serves under the influence of buzzer magnet 32 to wind coil spring 29 to a state of maximum tension when ratchet wheel 18 is released to rotate to its normal position. The buzzer action of magnet 22 is produced by a self-interrupting circuit including the operated contacts 23, normal contacts 33, winding of magnet 32, and grounded source of potential 34. Magnet 32, in operating, attracts armature 35 which is pivotally supported by rod 36, the distance of travel of armature 35 being controlled by adjusting pins 79 which extend through bar 37. Bar 37 is fixedly attached to the base structure, not shown. Pivotally supported by armature 35 and held in engagement with ratchet wheel 31 by spring member 38 is stepping pawl 39. A retaining pawl 40 locks ratchet wheel 31 in its stepped position. Self-interrupting operating circuit for magnet 32 is opened and closed by means of an insulated pin 41 which is detachably mounted on armature 35. When ratchet wheel 18 rotates to complete a revolution which occurs when the carriage-return key 14 is operated, projection 22 on cam 21 as hereinbefore stated, closes contacts 23 to close the self-interrupting operating circuit for magnet 32 and magnet 32 operates and releases alternately until coil spring 29 reaches a state of maximum tension at which time the self-interrupting circuit stalls by virtue of the value of current in the winding of magnet 32. The method of winding coil spring 29 to a state of maximum tension is not limited to the arrangement shown inasmuch as various other obvious methods may be employed such as by using a motor controlled by contacts 23, the motor being energized as long as cam 22 is in its normal position.

Three magnets, namely, character counting magnet 45, tabulating magnet 46 and carriage-return magnet 47 are provided to release the ratchet wheel 18 as desired, and to thereby allow indicator pointer 19 to advance, under the action of normally wound coil spring 29, in accordance with the functions or signals, perforated in the tape. Character magnet 45 is connected in a manner similar to the stepping magnet 27 shown in Fig. 6 of United States Patent 2,018,368, supra. The contacts 48 shown in the operating circuit for magnet 45 correspond to contacts 73 shown in United States Patent 2,018,368 and will momentarily close each time a printing or spacing signal is perforated in the tape. Each time magnet 45 operates, its armature 49 pivotally mounted on bar 50, moves downward to withdraw by means of pin 51 the right end of an escapement pawl 52 which is normally in engagement with the teeth of ratchet wheel 18. Pawl 52 is pivotally mounted on armature 53 of tabulating magnet 46 and the downward action of pin 51 forces the left end of pawl 52 into engagement with the teeth of ratchet wheel 18. Magnet 45 operates momentarily on all but non-spacing functions initiated by the operating keyboard and therefore, by the time that armature 49 is restored to its normal position and the right end of pawl 52 again engages the teeth of ratchet wheel 18, the wheel will have rotated under the influence of coil spring 29 the distance of one tooth in a counterclockwise direction. Thus indicator arm 19 will have stepped over one graduation of the scale on dial 20.

Tabulating magnet 46 is connected in a circuit extending from grounded battery 54 through the winding of the magnet over normally open contacts 55, conductor 56, over normally open contacts 57 to ground. The purpose of the tabulating magnet is to permit the rotating of ratchet wheel 18 through a distance equal to two or more steps without interruption and the purpose of the function is to permit the type carriage on the page printer at the receiving end of the transmission circuit to correspondingly skip over two or more spaces in a line of a message without interruption, in response to a single tabulation signal, or a single combination of perforations in a transmitting tape. Indicator pointer 19 on scale 20 (Fig. 6) accordingly rotates over two or more graduations corresponding in number to the spaces skipped, or to be skipped, if perforated signals are employed in a message line, by the type carriage of the page printer when the tabulating signal is received at the receiving end of the transmission circuit. Indicator pointer 19 thereby registers the total number of printing and spacing signals perforated either singly, that is, entirely by means of character magnet 45, or in groups, as by tabulating magnet 46, for each line of a transmitted message that is to be received on a page printer. The tabulating function is generally selected on upper case "G," but it may be selected on any other desired character, by momentarily operating tabulating key 12 after first operating shift key 11. It is necessary in initiating the tabulating function to arrange a set of contacts 57 to be closed by momentarily operating shift key 11 before operating key 12 so that closure of contact 55 will not operate tabulating magnet 46 when lower case "*g*" is pressed. When key 11 is operated, contact set 57 closes. The upper spring of contact set 57, in closing, rides down on the cam surface of latch member 58 which is pivotally mounted on a bar 59 fixedly connected to the base structure (not shown), and locks in the notch of member 58 to retain the operated spring member 57 in a closed position. Immediately following the operation of key 11, key 12 is operated and the spring members of contact 55 are momentarily closed in series with the operated spring members of contact set 57 to close the operating circuit for tabulating magnet 46. In this way, the tabulating magnet will receive an impulse only when key 12 is operated immediately after the operation of key 11. Magnet 46 in operating causes its armature 53 to disengage pawl 52 from ratchet wheel 18 and its armature

extension arm 61 which is pivotally supported on pin 62, to push connecting rod 63 upward. The upward movement of rod 63 rotates tabulating stop ring 24 in a clockwise direction. The rotating of tabulating ring 24 in a clockwise direction rotates the tabulating stop control pin 65 which may be inserted in any of the apertures in ring 24, a corresponding distance. The disengagement of escapement pawl 52 from ratchet wheel 18 permits the ratchet wheel to rotate in a clockwise direction under the tension of normally wound coil spring 29 until stop post 66 formed integrally with the ratchet wheel, engages its associated tabulating stop 27, which due to rotation of pin 55, was permitted under the tension of spring 67, to slide inward into the path of rotating stop post 66 thereby checking the rotation. The release of key 12 deenergizes tabulating magnet 46 and the consequent release of escapement pawl 52 causes the downward movement of connecting rod 63 to return the tabulating stop ring 24 to its normal position and the reengagement of the escapement pawl 52 with ratchet wheel 18. Tabulating stop ring 24 in returning to normal brings a control pin 65 into engagement with the cam surface 68 of projection 69 (Fig. 3) and forces or cams, tabulating stop 27 back to its normal position against the resistance of spring 67. To simplify the drawing, two tabulating stops only are shown. These tabulating stops may be located at any desired position around ratchet wheel 18.

Immediately after a tabulating function has been automatically completed by the operation of shift key 11 and tabulator key 12, in sequence, the operation of "Letters" key 13 or space key, or bar, 15, will depress the right-hand end of lever 70 which is pivotally supported by pin 71 in an upright member fixedly connected to the base structure (not shown). By means of the pivotal connection at pin 71 the left end of lever 70 is moved upward to actuate latch member 58 out of engagement with the upper spring of contact set 57 so that contact set 57 returns to its normally open condition. Key 12 may then be operated to perforate the tape for transmitting a lower case character. This arrangement is in accordance with a general practice whereby most of the teletypewriters now in use are arranged to unshift on "Letters" combinations only, or "Letters" and "space" combinations.

Carriage-return magnet 47 is connected in a circuit extending from grounded battery 72, through the magnet winding, conductor 73, closed contacts of normally open set 74 to ground. The purpose of carriage-return magnet 47, when operated coincidentally with the perforation of a carriage-return signal combination, is to permit ratchet wheel 18 to rotate uninterruptedly under action of spring 29 in a clockwise direction to the end of its revolution. The transmission of the carriage-return signal causes the type carriage of the page printer at the receiving end to be automatically returned to its normal position so that another line of the message may be started. In other words, should the last single character or punctuation in a message line not be at the end of a line, the function of the carriage-return magnet would be similar to that of the tabulating magnet in that ratchet wheel 18, in response to the operation of the carriage-return magnet, is rotated uninterruptedly over a plurality of consecutive spaces to the end of its revolution which is the starting point and at which point it is stopped by the engagement of stop post 66 with carriage-return stop lever 75.

When key 14 is operated, contacts 74 close to operate carriage-return magnet 47 and the magnet in operating, attracts its armature which is pivotally mounted on pin 77 to pull connecting rod 78 in a rightward direction whereby carriage-return stop ring 25 is rotated in a clockwise direction. The carriage-return stop ring is arranged to engage tabulator stop ring 24 by lip 80 coacting with notch 81 so that whenever the ring 25 is rotated, ring 24 is likewise rotated. The rotation of ring 25 at this time causes the escapement pawl 52 to become disengaged from ratchet wheel 18 so that wheel 18 may now rotate in a counterclockwise direction under the influence of the normally wound coil spring 29. However, in order to prevent the tabulating stop 27 from engaging stop post 66 on a carriage-return signal, a tabulating cut-out pin 82 is provided on carriage-return stop ring 25 at a point in close proximity to each of tabulating stops 27. The cut-out pins 82 engage their respectively associated tabulating stops before the stops are released by their respective control pins 65. Therefore, only the carriage-return stop lever 75 is brought into the path of stop post 66 when a carriage-return signal is selected, or perforated. The ratchet wheel in advancing to the end of its revolution is stopped by stop post 66 coming into engagement with stop lever 75 and the indicator arm 19 will at this time indicate the beginning of the next message line that is to be recorded on a page printer. With stop post 66 engaging stop lever 75 the projection 22 on cam wheel 21 closes at contact set 23 an operating circuit for winder magnet 32, which now operates as a buzzer as hereinbefore stated, and causes its armature 35 to vibrate whereby the ratchet wheel 31 is stepped in a counterclockwise direction to again wind the involute coil 29. Carriage-return stop lever 75 is pivotally mounted, as shown, on fixed plate 26 and includes an arm, or pawl, 83 integrally formed therewith, for locking carriage-return stop ring 25 in an operated, or rotated, position which makes it unnecessary to hold the carriage-return key 14 operated until indicator arm 19 is rotated to its starting position. As the carriage-return magnet 47 rotates the carriage-return ring to its extreme position, the lock-up pawl 83 engages a notch 84 in ring 25 holding it in the operated position until the pawl 83 is tripped out by stop post 66. Lock-up pawl 83 is so positioned that it is cammed out by the stop post 66 just as the post engages the carriage-return stop lever 75.

Fig. 5 is a modification of a tabulating stop shown in Fig. 2. The parts shown in Fig. 5 have the same reference characters as their corresponding parts in Fig. 2 except that those parts in Fig. 5 which differ in shape or connection from their corresponding parts in Fig. 2, have their reference characters marked with prime signs for the purpose of identification.

Fig. 6 shows the indicator arm 18 with respect to the graduated scale on dial 20. The entire tabulating device shown in Fig. 2 is enclosed in a housing 20 and in such housing it may be detachably mounted on the housing of a keyboard perforator transmitter.

Fig. 7 shows a schematic of the circuit arrangement of the device shown in Fig. 2. The apparatus parts shown in Fig. 7 are designated by reference characters similar to those used on the corresponding parts shown in Fig. 2. No description of the circuit shown in Fig. 7 is deemed

necessary in view of the description hereinbefore given for Fig. 2.

What is claimed is:

1. A stepping device comprising operable keys, concentrical rotating shafts, a ratchet wheel mounted on each of said shafts, means controlled by the ratchet wheel on one of said shafts for storing energy in the ratchet wheel on the other of said shafts, a plurality of electromagnetic means, means for releasing said energized ratchet wheel one step each time one of said electromagnetic means is operated in response to the operation of certain of said keys, other means for releasing said energized ratchet wheel through a plurality of steps without interruption each time another of said electromagnetic means is operated in response to other of said keys, and still other means for releasing said energized ratchet wheel through a sufficient number of steps without interruption to completely deenergize said energized ratchet wheel, each time still another of said electromagnetic means is operated in response to still another of said keys.

2. An indicating device comprising operable keys, a stepping member controlled by said keys, means responsive to the operation of any one of certain of said keys for stepping said member one step in one direction, means responsive to the operation of a plurality of others of said keys for stepping said member a plurality of steps uninterruptedly in said one direction, a pointer fixedly mounted on said member and a dial therefor whereby the total number of steps taken in a predetermined interval by said member are indicated at any time.

3. An indicating device comprising operable keys, a stepping member controlled by said keys, means responsive to the operation of any one of certain of said keys for stepping said member one step in one direction, means responsive to the operation of a plurality of others of said keys for stepping said member a plurality of steps uninterruptedly in said one direction, means responsive to still another of said keys for stepping said member one or more steps uninterruptedly in said one direction to its starting point, a pointer fixedly mounted on said member and a dial therefor whereupon the total number of steps taken in a predetermined interval by said member are indicated at any time.

4. A tape perforator for perforating permutation code signal combinations for later transmission, a keyboard for operating said perforator, a receiving machine arranged to advance one space in response to each of certain of said combinations, and a plurality of spaces in response to another of said combinations when said combinations are transmitted, and a counter comprising a pointer and controlled by said keyboard for advancing said pointer one step for each of said certain combinations and a plurality of steps uninterruptedly for each combination adapted to advance said receiving machine a plurality of spaces, to indicate to the perforator operator, while operating said keys, the position upon a message line to be assumed by said receiving machine at any time.

5. A tape perforator for perforating permutation code signal combinations for later transmission, a recording device, a keyboard comprising operable keys for controlling said perforator, certain of said keys arranged to cause perforations of said signal combinations for advancing said recording device one step for each of said certain combinations and other of said keys for causing the perforation of other of said signal combinations for advancing said recording device uninterruptedly a plurality of steps for each of said other combinations, an indicator controlled by the operation of said keys for indicating to the perforator operator, while operating said keys, the position upon a message line to be assumed by said recording device when each of said signal combinations is received.

6. A tape perforator for perforating permutation code signal combinations for later transmission, a recording device, a keyboard comprising operable keys for controlling said perforator, certain of said keys respectively arranged to cause the perforation of said signal combinations for advancing said recording device one step for each of said certain combinations, other of said keys for causing the perforation of said signal combinations for advancing said recording device a plurality of steps for each of said other combinations, another of said keys for causing the perforation of a special one of said signal combinations for restoring said recording device to its normal position, a normally energized stepping member arranged to operate one step in response to the operation of each of certain keys, a plurality of steps in response to each operation of said other keys, and to its normal position in response to the operation of the restoring key, means arranged to operate when said stepping member steps into its normal position to cause said stepping member to become energized, and a recorder controlled by the operation of said keys for indicating to the perforator operator, while operating said keys, the position upon the message line to be assumed by said recording device when each of said signal combinations is received.

7. A tape perforator according to claim 5, wherein the counter comprises a graduated scale, an indicating pointer therefor, means for uninterruptedly advancing said indicating pointer to predetermined positions on said scale, said positions respectively corresponding to the settings of said tabulator stops, other means for advancing said indicating pointer one graduation at a time to correspond to a signal subsequently recorded on said receiving machine as a single character or a space of unit length, still other means for uninterruptedly advancing said indicating pointer to its normal, or starting, position when a special permutation code signal is perforated, and restoring means on said receiving machine for restoring said machine to normal when the special code signal is received by said recorder.

8. An indicating device comprising operable keys, concentrical rotating shafts, a ratchet wheel mounted on each of said shafts, means controlled by the ratchet wheel on one of said shafts for storing energy in the ratchet wheel on the other of said shafts, a plurality of electromagnetic means, means for releasing said energized ratchet wheel the distance of the width of one tooth on said ratchet wheel each time one of said electromagnetic means is operated in response to the operation of certain of said keys, other means for releasing said energized ratchet wheel through the distance of a plurality of teeth on said ratchet wheel without interruption each time another of said electromagnetic means is operated in response to the operation of other of said operable keys, still other means for releasing said energized ratchet wheel through a

distance of sufficient number of teeth on said ratchet wheel without interruption to completely deenergize said energized ratchet wheel each time still another of said electromagnetic means is operated in response to still another of said keys, a pointer and scale therefor, arranged to indicate at any time during stepping operation the total number of teeth through which said energized ratchet wheel is released, and means controlled by said energized ratchet wheel for reenergizing said energized ratchet wheel whenever said energized ratchet wheel is completely deenergized.

9. A printing telegraph system comprising a source of signal combinations, a telegraph keyboard for controlling the transmission of said signal combinations, a tabulator and character counter having an indicator, a plurality of means responsive to signal combinations received from said keyboard, one of said means responsive to certain signal combinations respectively representing spaces of two or more unit lengths for uninterruptedly advancing the indication on said indicator through successive steps, another of said means responsive to other signal combinations respectively representing characters and spaces of unit length for advancing the indication on said indicator one step at a time, and still another of said means responsive to another of said signal combinations having a non-spacing function for uninterruptedly advancing said indication on said indicator through a sufficient number of successive steps to attain its normal position.

10. In a communication system, a code receiving instrument having recording means and an element upon which characters are to be recorded, said means and element being relatively movable with respect to a fixed point of reference, means whereby said movement is in unit amounts for certain codes and a multiple amount for each of at least one other code, in combination with a sending end instrument, connectible to said receiving instrument over a channel of transmission, lacking said recording means and provided with an indicator having an instrumentality for progressively indicating departures from a fixed point of reference corresponding to that in the receiving instrument by indicating the summation of said unit amounts and multiple amounts for each of said other code or codes whereby an operator at said sending end instrument will be constantly apprised of the position with respect to said point of reference which said means and said element will assume in response to any definite sequence of codes.

11. The method of operating a printing telegraph system including a key-operated sending device which does not print locally the sent matter in definite lines, a receiving device which does print locally in definite lines connected thereto over a channel of transmission, and an indicator local to the sending device and observable by the operator thereat, which comprises advancing the indicator one unit for every code combination which will advance the receiving device one unit upon a line, advancing the indicator a corresponding plurality of units for every code combination which will advance the receiving instrument a corresponding plurality, and restoring the indicator to zero position upon every code combination which will restore the receiving instrument to the beginning of a line.

12. A printing telegraph system comprising a telegraph keyboard for successively setting up permutation code signal combinations representing characters, spaces of unit length, and non-spacing functions, a tape perforator responsive to the operation of said keyboard for perforating said permutation signal combinations for subsequent transmission, a tabulator and character counter having a graduated scale and an indicating pointer therefor, a plurality of means responsive to signal combinations received from said keyboard, one of said means responsive to certain signal combinations respectively representing spaces of two or more unit lengths for uninterruptedly advancing said pointer over groups of graduations of said scale, another of said means responsive to other signal combinations respectively representing characters and spacers of unit length, for advancing said pointer one graduation at a time, and still another of said means responsive to another of said signal combinations having a non-spacing function for uninterruptedly advancing said pointer over a sufficient number of graduations on said scale to its normal position.

13. A printing telegraph system according to claim 12, wherein said keyboard comprises means for conditioning said one of said means for uninterruptedly advancing said pointer over groups of graduations on said scale and control means for preventing the actuation of said one of said means until after the conditioning means are operated.

14. An indicating device according to claim 2 wherein said stepping member has in engageable relation therewith a plurality of removably positionable stop elements respectively arranged to be set in position corresponding to the groups of steps to which said pointer is uninterruptedly stepped.

15. A printing telegraph system comprising a telegraph keyboard, a tabulator and character counter having a rotatable stepping disc normally locked in an energized position, a stop element fixedly mounted on said disc, a plurality of normally locked plunger bars in engageable relation with said stop element and respectively located at arbitrarily predetermined points around the periphery of said disc, latching means for locking said disc in a plurality of energized positions, key-operated means controlled from said keyboard for momentarily releasing said latching means to release said disc to rotate one step at a time, a second key-operated means controlled from said keyboard for releasing said locking means and said plurality of normally locked spring-operated bars to release said disc to uninterruptedly rotate the discs two or more steps until one of said spring-operated members engages said stop member, a key-operated means controlled from said keyboard for operating said second key-operated means and locking said plurality of spring-operated bars in their normal position to release said disc to uninterruptedly rotate through the remaining steps to complete a revolution, a spring-controlled pawl for locking said second and said third key-operated means in operated positions until said disc completes a revolution, and a lever in engageable relation with said stop element for releasing said spring-controlled pawl when said disc completes a revolution.

16. In a printing telegraph system, a source of telegraph signals of spacing and non-spacing character, a keyboard perforator transmitter for preparing for transmission signals of one or more spaces of unit length from said source and

a tabulator and character counter comprising means responsive to the signals of spacing and non-spacing character prepared at said transmitter for cumulatively indicating to the operator at any time, while operating said transmitter, the total number of spaces of unit length in accordance with the lesser number of prepared signals.

17. In a telegraph system, a source of telegraph signals, a keyboard perforator-transmitter having keys for preparing signals of spacing and non-spacing character, and a counting device comprising a ratchet wheel rotatably mounted, stepping means for normally maintaining said ratchet wheel in an operated position, electromagnetic means responsive to the operation of certain of said keys whereby the operation of said certain keys prepares signals of a single spacing character and whereby said ratchet wheel is permitted to rotate one step only, other electromagnetic means responsive to a certain other of said keys whereby the operation of said certain other keys prepares signals of two or more spaces duration and whereby said ratchet wheel is permitted to rotate uninterruptedly two or more steps as desired, still other electromagnetic means responsive to one of said keys whereby the operation of said one of said keys prepares a signal of non-spacing character and whereby said ratchet wheel is permitted to rotate uninterruptedly to the end of its revolution, indicating means rotatably mounted with said ratchet wheel for indicating the position of said ratchet wheel with respect to its said normally operated position and still other electromagnetic means responsive when said ratchet wheel is rotated to the end of its revolution for operating said stepping means until said ratchet wheel is restored to its normally operated position.

18. In a telegraph system according to claim 17 wherein said stepping means comprises two rotatable rings arranged concentrically with the axis of said ratchet wheel and each other and respectively controlled by the second and third electromagnetic means, and means for locking said rings in their off-normal rotatable position until said ratchet wheel is rotated to the end of its revolution.

19. In a telegraph system according to claim 17, wherein said stepping means comprise spring operated stop members arranged to be arbitrarily positioned in one or more radial positions around said ratchet wheel, two rotatable rings arranged concentrically to said ratchet wheel and with each other, removable means arbitrarily positioned in one of said rings for normally locking said stop members in unoperated positions, pivotal means responsive to the operation of the second-mentioned electromagnetic means for rotating said one of said rings to operate said stop members and responsive to the release of the second-mentioned electromagnetic means for restoring said stop members, pivotal means responsive to the third-mentioned electromagnetic means for causing the rotation of said two rotatable rings and removable means arbitrarily positioned in the other of said rings for locking said stop members in their unoperated position when both of said rings are rotated and maintaining them in unoperated positions until said ratchet wheel rotates to the end of its revolution.

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