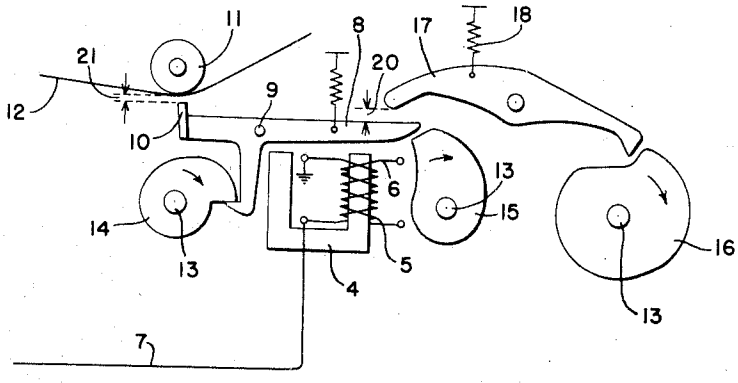
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PRINTING TELEGRAPH APPARATUS

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PRINTING TELEGRAPH APPARATUS

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The present invention relates to printing telegraph apparatus and more particularly to the receiving component of such apparatus.

The principal object of the invention is the provision of an arrangement for the rapid and efficient recording of character symbols.

A feature of the invention resides in a receiving system responsive to current impulses of diminutive value yet enabling the rapid and reliable recording of character symbols.

A further feature of the invention resides in a receiving system including a single electromagnet which serves the dual capacity of releasing the driving mechanism and operating the printing mechanism.

The above and other objects of the invention are accomplished as specifically applied to a receiving printer wherein the character symbols are composed of individual printed lines by arranging an electromagnet to respond to the received impulses to release the driving portion of the receiving apparatus for rotation and to serve to control the action of the printing hammer which cooperates with the spiral of the printing wheel to print character symbols, and which is moved mechanically after the driven portion is released for rotation to maintain a predetermined relationship with the printing wheel to minimize the energy required to energize the electromagnet for printing. Such an arrangement predetermines the length of stroke of the release arm and the printing hammer which makes possible very efficient and reliable operation with an extremely low current strength.

A more complete understanding of the invention may be had from the following description taken in conjunction with the accompanying drawing which illustrates the invention as applied to a printing telegraph receiver of the type shown in Patent No. 2,046,328 to E. E. Kleinschmidt et al., granted July 7, 1936.

Referring now to the drawing which shows diagrammatically and in exploded relationship the parts of a receiving printer embodying the features of the present invention, a receiving electromagnet 4 consisting of two windings 5 and 6 is shown with the winding 5 connected to a line conductor 7. Current is normally impressed on line conductor 7 at the transmitter located either remotely or locally. However, under either location of the transmitter, current normally flows through winding 5 of the electromagnet, and consequently its armature 8 is attracted. Winding 6 is provided as a delay or retard winding and may be either short circuited or placed in a delay current circuit, whereupon it is possible to choose any advantageous delay period. The short circuit may also be accomplished through a contact controlled by the transmitter so that it exists for only a certain time interval; for example, the time of the start pulse.

As indicated, the electromagnet 4 is normally energized by current impressed on line conductor 7 and further, armature 8 is in one of its attracted positions. In such position armature 8 being rotated about its pivot 9 against the action of a rectractile spring, the printing hammer which is formed at one extremity of armature 8 is held out of engagement with printing wheel 11, which, as exemplified in the foregoing patent to E. E. Kleinschmidt et al., carries on its periphery a spiral printing edge which may be made suitable for printing on a strip 12 through the use either of an inking wheel or a carbon strip or ribbon. Inasmuch as the method of inking the spiral printing edge does not constitute a part of the present invention, the structure therefor has not been shown.

The receiving printer includes a driven shaft 13 to which power is communicated from a continuously rotating motor, not shown, through a friction clutch, not shown. Secured to shaft 13 are a plurality of cams 14, 15, and 16. Cam 14, which may be referred to as a stop cam or stop lug, cooperates with a hook portion integral with the armature 8 of electromagnet 4 to hold shaft 13 against rotation during the idle period of the receiving printer. When a start impulse is received or when current is removed from line conductor 7, armature 8 is released and is rotated by its retractile spring about its pivot 9 to a position where the hook portion is free of the stop cam or stop lug 14. Shaft 13 is then rotated by power communicated from the continuously rotating motor through the indicated friction clutch.

Also secured to shaft 13 are cams 15 and 16 which serve to limit the travel of armature 8. For releasing shaft 13, it is necessary that armature 8 have a predetermined travel, whereas for printing, such required travel is considerably less than in the case of the releasing operation. In order to achieve the principal object of the invention, the cams 15 and 16 serve to control the travel of armature 8 in its function to release shaft 13 for rotation and to print through the cooperation of printing hammer 10 with the spiral on the printing wheel 11. Cam 15 cooperates with the right extremity, as shown in the drawing, of armature 8, and in its normal

position limits the downward travel of armature 8, whereas cam 16 cooperates with pivoted lever 17 normally under the tension of a spring 18 to limit the back travel of armature 8. The armature 8 and lever 17 are so formed or shaped to produce the described cooperation with the respective cams 14, 15 and 16.

To effect release of shaft 13, it is necessary that the armature 8 travel a distance such as indicated by the numeral 20. The movement of armature 8 to effect release of shaft 13 is determined by the position of lever 17 which, as previously noted, is under the control of cam 16. Likewise, the travel of armature 8 in a direction against the action of its retractile spring is determined by cam 15 which, when in a position removed from normal, allows armature 8 to be attracted through a distance corresponding to the distance indicated by the numeral 21 sufficient to effect printing on the tape or strip 12 in response to the energization of winding 5 of electromagnet 4. Consequently, in response to subsequent character impulses the distance through which the armature 8 against the action of its retractile spring must move to effect printing is materially reduced, which results in a corresponding reduction in the electrical energy required to produce the necessary movement of the printing edge through distance 21 and in an increase in speed of printing which is effected by the electrical impulses received following the initial deenergization of the electromagnet 4 to release shaft 13 for rotation.

Normally, current flows through winding 5 and armature 8 is attracted against the action of its retractile spring to hold the hook portion in the path of stop cam or stop lug 14. Shaft 13 is thus held against rotation. Upon the removal of current from the line or in response to the receipt of a start impulse, electromagnet 4 is deenergized and its armature 8 is moved by its retractile spring through a distance indicated by the numeral 20 or to a position in contact with one extremity of lever 17. Such movement is sufficient to remove the hook portion of armature 8 from engagement with the stop cam 14 and thereupon shaft 13 is released for rotation and is rotated by power communicated from a continuously rotating motor through a friction clutch. With the rotation of shaft 13, cams 15 and 16 are rotated. The contour of cam 15 is such as to allow movement of armature 8 in response to electrical impulses through a distance sufficient to force the printing hammer 10 into printing relation with the spiral on the printing wheel 11, whereas cam 16 when in offnormal position, moves lever 17 against the action of spring 18 to a position such that the separation between armature 8 and the one extremity of lever 17 is substantially reduced, so that the movement of the armature 8 from its unenergized position to its energized position or printing position is minimized. In other words, the cams 15 and 16 serve to control variably the stop positions of armature 8. In the case of cam 15, the stop position of armature 8 is determined directly by the contour of the cam. The unenergized position of armature 8 is determined by the position of lever 17 which, during rotation of cam 16, will be moved about its pivot to force armature 8 closer to the pole faces of electromagnet 4.

From the foregoing description, it is apparent that the cam 16, through its lever 17, allows a longer stroke of armature 8 for effecting release of shaft 13. However, during printing operation in response to electrical impulses, the stroke or the movement of armature 8 is decreased corresponding to the contour of cam 16.

Following the recording of the last element of the character symbol, current may be impressed upon line conductor 7 to cause the prolonged energization of electromagnet 4 in timed relation to the rotation of shaft 13. Under such conditions, armature 8 will be in the position shown in the drawing, and the hook portion thereof will lie in the path of the stop cam or stop lug 14. Shaft 13 will, under such conditions, be held against rotation.

The drawing shows the invention as embodied in a particular type of receiving printer. It is however, obvious that the invention may be embodied in other forms of receiving printers without departing from the spirit and scope of the present invention.

What is claimed is:

1. A printing telegraph receiver including an electromagnet responsive to signal impulses, an operating shaft, means for normally holding said shaft against rotation actuated upon the initial operation of said electromagnet, and means effective following the release of said shaft for establishing a condition to reduce the energy required to operate said electromagnet.

2. A printing telegraph receiver including an electromagnet responsive to signal impulses, an armature therefor, an operating shaft, means controlled by said armature for holding said shaft against rotation and actuated by the initial operation of said electromagnet, and means effective depending upon the position of said shaft for determining the travel of said armature for the printing operation.

3. A printing telegraph receiver including an electromagnet responsive to signal impulses, an operating shaft, means for normally holding said shaft against rotation, an armature for said electromagnet controlling said means, means for allowing an extended travel of said armature in response to a start impulse to release said shaft, and means for restricting the travel of said armature for the remainder of the signal period.

4. A printing telegraph receiver including an electromagnet responsive to signal impulses, an operating shaft, means for normally holding said shaft against rotation, an armature for said electromagnet controlling said means, means including a cam for allowing an extended travel of said armature in response to a start impulse to release said shaft, and another cam operated in timed relation with said specified cam for restricting the travel of said armature for the remainder of the signal period.

5. A printing telegraph receiver including a printing wheel, an electromagnet responsive to signal impulses, an operating shaft for driving said printing wheel, means for normally holding said shaft against rotation, an armature for said electromagnet controlling said means, means for allowing an extended travel of said armature in response to a start signal impulse to release said shaft and cause the rotation of said printing wheel, and means for restricting the travel of said armature during printing of the character from said rotating printing wheel.

6. A printing telegraph receiver including an electromagnet responsive to signal impulses, an operating shaft, means for normally holding said shaft against rotation, an armature for said electromagnet controlling said means, a stop for

allowing an extended travel of said armature in response to a start signal impulse to release said shaft, and means operated in response to the rotation of said shaft for moving said stop into closer relationship with said armature thus to control the travel of said armature for the printing operation.

7. A printing telegraph receiver including an electromagnet responsive to signal impulses, an operating shaft, means for normally holding said shaft against rotation, an armature for said electromagnet controlling said means, a pivoted stop for allowing an extended travel of said armature in response to a start signal impulse to release said shaft, and a cam secured to said shaft and operated thereby for moving said pivoted stop closer to said armature thereby to restrict the travel of said armature for the operation of printing.

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