Nov. 5, 1935. E. W. HEWITT ET AL 2,019,855

TAPE PULLER FOR PROJECTORS

Filed March 29, 1934

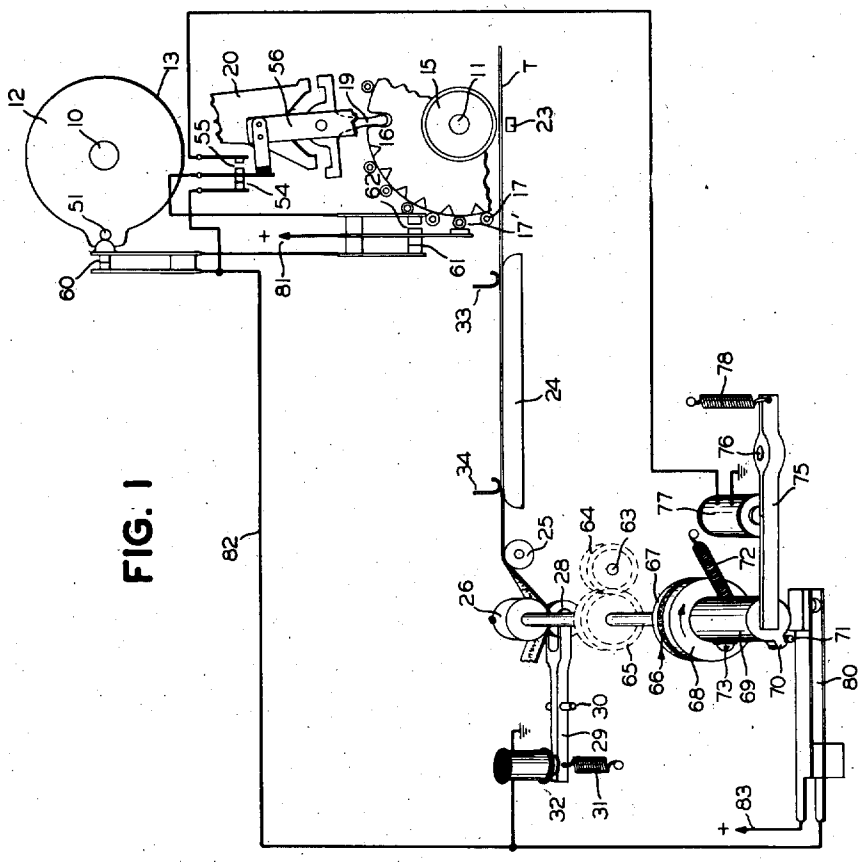

FIG. 1

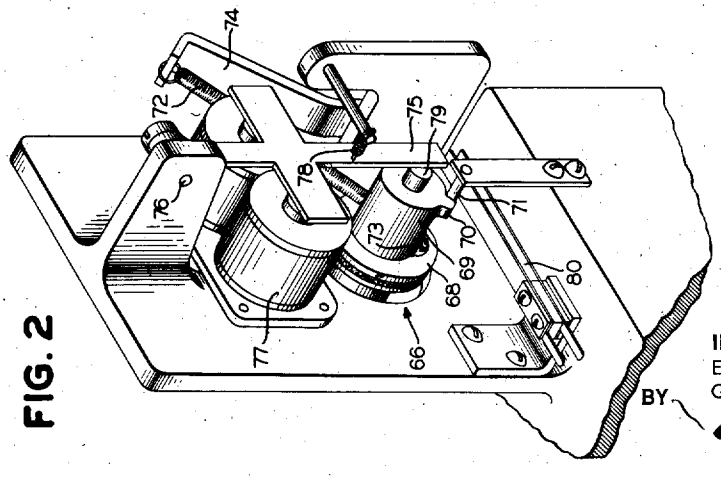

FIG. 2

INVENTORS
E. W. HEWITT
G. I. ROBERTS

BY Eugene G. Brown
ATTORNEY

Patented Nov. 5, 1935 2,019,855

UNITED STATES PATENT OFFICE

2,019,855

TAPE PULLER FOR PROJECTORS

Ernest W. Hewitt, Stamford, Conn., and George I. Roberts, New York, N. Y., assignors to The Western Union Telegraph Company, New York, N. Y., a corporation of New York

Application March 29, 1934, Serial No. 718,045

12 Claims. (Cl. 178—42)

This invention relates to telegraph printing and projecting systems in which information, such as stock quotations, printed upon a tape are projected upon a screen for observation. More particularly the invention relates to means for controlling the movement of the tape through the field of the projector.

One of the fundamental requirements of ticker tape projectors, in order to enable the projected quotations easily readable, is that movement of the tape through the field of the projector be smooth and uniform. The usual printers employed for printing stock quotations, however, eject the tape intermittently, as each character is printed, and in order to absorb this intermittent motion of the tape it has been usual to permit a loop of tape to accumulate between the ticker and the projector, with the tape puller disposed at the opposite side of the projector to draw the tape more or less continuously through the projector, the tape being stopped only when the loop decreases to a predetermined minimum size.

While this method of operation, if properly conducted, results in a smooth movement of the tape, it has the disadvantage of producing a considerable lag between the printing of a quotation and its appearance on the screen, due to an appreciable length of tape in the loop between the printer and the projector. If the transmission of quotations is interrupted at any time, the tape puller may continue to operate until the loop is somewhat decreased in size but there is always a number of quotations on the tape which cannot be projected until the ticker again resumes operation. In some cases the delay in presenting these quotations upon the screen may be very considerable.

In the transmission of stock quotations, the quotations are perforated in the tape at the transmitting station and transmitted automatically over the ticker lines by means of standard forms of tape transmitters. If the market is active, the perforating proceeds substantially continuously and the corresponding signals are transmitted at a uniform rate over the lines with but few interruptions. In a slow market, while there may be more frequent interruptions in the transmission, the signals are ordinarily transmitted in groups, each group comprising a number of whole quotations. The rate of transmission of the signals of each group, however, proceeds at a uniform rate, usually about five hundred characters per minute, independently of the length or number of quotations in the group. If the perforating operator becomes even with the market or for any other reason stops perforating for a short interval, the procedure is to conclude the group of quotations previously perforated with a number of figure dots, the purpose of these signals being to space the tape out of the printer sufficiently to enable the last quotation to be entirely visible in the printer.

We take advantage of these characteristics of the transmitted signals to control the movement of the tape through the projector in a novel manner, one of the objects being to entirely eliminate the use of a tape loop and thereby avoid the time lag between the printing and the projecting of the quotations, incident to the use of such a loop.

Another object is to provide an even and uniform movement of the tape across the field to the projector.

Another object is to enable the last quotation preceding an interruption in the transmission of signals to be projected without delay.

A still further object is to provide a device capable of distinguishing between the short interruptions in the operation of the printer occurring in the normal operation of the tape transmitter and the longer intervals produced by the perforating operator between successive groups or strings of quotations.

Other objects and advantages of the invention will hereinafter appear.

In accordance with our invention we start the movement of the tape when the first character of a string of quotations is received and maintain the movement thereof continuous as long as the successive characters are received without interruption, the tape passing directly from the ticker to the projector without an intermediate loop. By placing the outlet of the ticker close to the inlet of the projector there will be but a short length of tape therebetween and each quotation will appear on the screen with negligible delay. The elimination of the tape loop without the resulting jumpiness of the projected images is made possible by feeding the tape in a continuous manner from the printer, printing being effected on the fly in place of the usual practice in which the tape stops during the printing stroke. For this purpose the usual tape feed is entirely eliminated from the printer and the tape drawn past the type wheel by a tape feed mechanism disposed at the opposite side of the projector from the printer.

The movement of the tape is made uniform and continuous as long as the printer continues to operate in response to a group or string of quotations. If the operation of the printer is in-

terrupted momentarily in the middle of a quotation, which occurs only occasionally, the tape is stopped until printing is resumed, but upon cessation of signals for a longer period, due to the perforating operator ceasing to perforate the tape for a more or less extended period and preceding which figure dot signals are perforated in the tape, the mechanism responds to these signals to continuously advance the last quotation into the field of the projector, after which the tape is stopped until the printer again resumes operation.

The invention will be more fully understood by reference to the accompanying drawing in which

Figure 1 is a diagrammatic view of a tape printing apparatus and tape pulling mechanism embodying the present invention, and

Figure 2 is a perspective view of the timing device used in the apparatus of Figure 1.

The type of tape printer with which the invention is shown is that ordinarily known as a high speed stock ticker having a commercial designation "Ticker 5A", the details of construction of which are shown in United States patent to Morton, et al., No. 1,821,110, granted September 1, 1931. Only such parts of the printer mechanism are shown as are necessary for an understanding of the present invention.

Referring to the drawing, the printer employs two parallel shafts 10 and 11, the former carrying the selecting cam drum (not shown) and an operating cam 12, having an external cam face 13. The shaft 11 carries the type wheel 15 and surrounding this shaft is a series of five notched code disks 16, one only of which is shown, with which an annular group of type wheel stop bars 17 cooperate. The stop bars are normally held in an outward position by the periphery of the disks 16 but in each combination in which disks may be set the notches of all of the disks will be alined opposite one of the stop bars to permit the stop bar to move readily inward. These stop bars determine the printing position of the type wheel.

Adjacent one of the stop bars 17', which corresponds to the figures dot selection, are contacts 61 and 62 controlled thereby, the former contact being closed when the stop bar 17' is in its outward or unselected position and contact 62 being closed only upon the selection and inward movement of the stop bar 17'.

The disks 16 are selectively positioned by means of transfer levers 19 cooperating with individual selecting levers 20, positioned in the various code combinations by the selector cam (not shown) positioned on the shaft 10.

The tape T is drawn from a reel (not shown) located at the right of the type wheel 15 and thence between the type wheel and the platen 23. From this point it passes from the printer and across a support 24 where it may be directly observed or projected on to a suitable screen. From the support 24, the tape passes over a guide roller 25 and under the tape feeding roller 26 which is driven through the gears 64 and 65 by a suitable motor, only the shaft 63 of which is shown. A pressure roller 28, carried by a lever 29 pivoted at point 30, is urged into contact with the roller 26 by means of a spring 31, but is adapted to be held out of contact therewith by an electro-magnet 32. A pair of J-springs 33 and 34 maintain the tape taut across the support 24 and prevent movement thereof by the feed roller 26, when the roller 28 is not in engagement therewith.

A pair of contacts 60 are arranged to be engaged by a pin 51 projecting from the face of the operating cam 12 so as to be closed whenever the cam is in the stop position, as shown in Figure 1.

Still other contacts 54 and 55 are arranged to be operated by the shift lever 56 of the printer, the contact 54 being closed when the shift lever is in the letters shift position as shown, and contact 55 being closed when the shift lever is in the opposite or figures shift position. The shift lever 56, in printers of the type shown, is operated by the sixth impulse added to the code group, through one of the transfer levers 19.

A clutch 66 having a driving element 67 rotating with the feed wheel 26 and a driven element 68, serves to time the feeding out of the tape whenever a figures dot is received. For this purpose the driven element 68 has a cylindrical extension 69 from which a radial stop element 70 projects. The clutch faces are normally disengaged and the stop 70 held against an abutment 71 by a spring 72. The spring 72 partially encircles the drum 69 and is secured thereto by a screw 73. The opposite end of the spring 72 is secured to a bracket 74 and is disposed so as to exert both a tangential and an axial force on the drum thereby tending to rotate it counter clockwise and at the same time to hold the faces of the clutch 66 disengaged.

The clutch faces may be brought into engagement by a lever 75 pivoted at 76, which is adapted to be attracted by an electro-magnet 77 against the action of a spring 78, to engage the outer end 79 of the cylinder 69 to force the same axially inward against the tension of spring 72 to bring the faces of clutch 66 into frictional engagement. When this occurs the cylinder 69 is rotated through substantially a full revolution against tension of spring 72 to bring the stop 70 in position to close a pair of contacts 80. The amount of rotation of the stop 70 from the abutment 71 into engagement with contacts 80 is just sufficient to enable the last quotation printed on the tape to be advanced on to the support 24 and hence into the field of the projector.

The operation of the apparatus is as follows:

With the printer at rest and a selection other than that corresponding to the stop bar 17' set up in the disks 16, contacts 60 and 61 will be closed and contacts 62 and 80 will be open. Either contact 54 or 55 will be closed depending upon whether the last selection was a letter or figure character. Battery is therefore supplied from a source 81 through the contacts 61 and 60, in series, and conductor 82 to the electromagnet 32 to energize the same and thereby hold the pressure roller 28 out of contact with the feed roller 26. Consequently the tape remains at rest. As soon as the printer starts, to receive a character, contacts 60 open deenergizing magnet 32 to release the pressure roller 28 and into engagement with the tape T and thus cause the tape to be fed across the support 24. When a figures dot signal is received at the end of a group of quotations the printer comes to rest with contacts 60, 62 and 55 closed, thereby establishing a circuit from the source 81 through contacts 62 and 55 in series to the winding of the clutch magnet 77 causing energization thereof and consequent engagement of the clutch 66 thereby permitting the stop element 70 to be rotated into engagement with the contacts 80 to close the same. The closure of contacts 80 establish a circuit from the source of potential 83 through

contacts 60 to the winding of the feed magnet 32 to thereby energize the same and cause the movement of the tape to be arrested. As stated, the movement of the stop member 70 into position to close the contacts 60 at this time corresponds to that required to feed the last printed character on to the support 24 and thus into the field of the projector.

The stop bar 17' in addition to controlling the figures dot also controls the stopping of the type wheel in position to print a character from the letters row of the type wheel. When the letter character is selected by the stop bar 17' it is not desired to feed out the tape since the letter character may occur at times other than at the end of a group of quotations. When the stop bar 17' is selected in the letter shift position of the printer contacts 54 will be closed, due to the shift lever 56 being in the letters shift position and consequently the closing of contact 62 by selection of the stop bar 17' instead of energizing the clutch magnet 77 of the timing mechanism completes a circuit from the source of potential 81 through contacts 62 and 54 in series and conductor 82 directly to the winding of the feed magnet 32 to thereby energize the same and arrest the movement of the tape.

Therefore, if an interruption in the signals occurs other than at the end of a group of quotations, that is any time other than after the reception of the figures dot selection, contact 60 will be closed and also either contact 61 or contacts 62 and 54. Either of these conditions, as stated, cause the circuit to magnet 32 to be closed immediately to bring the tape to rest so that when signals are resumed there will be no abnormal space between the characters of a single quotation.

It is understood, of course, that the invention is susceptible to various modifications and may be embodied in different forms. Therefore we do not desire to be limited to the particular details of construction shown and described.

What we claim is:

1. In combination, a tape recorder, a support, a tape pulling mechanism for advancing the tape from the recording position of said recorder to and across said support, means responsive to a predetermined selective operation of said recorder, preceding an interruption in the operation thereof, for controlling said pulling mechanism to advance the last recorded character onto said support, metering means comprising a rotary element, means for moving the said element from a normal position to a tape arresting position, over a period of time not less than the period required for the tape pulling mechanism to advance the tape from recording position onto said support, and means controlled by said element in its tape arresting position for rendering the tape pulling mechanism ineffective to advance the tape.

2. In combination, a tape recorder, a support, a tape pulling mechanism for advancing the tape from the recording position of said recorder to and across said support, means responsive to a predetermined selective operation of said recorder, preceding an interruption in the operation thereof, for controlling said pulling mechanism to advance the last recorded character onto said support, metering means comprising motor driven means for moving said element from a normal to a tape arresting position, over a period of time substantially equal to the period required for the tape pulling mechanism to advance the tape from recording position onto said support, and means controlled by said element, in its tape arresting position, for rendering the tape pulling mechanism ineffective to advance the tape.

3. In combination, a tape recorder, a support, a tape pulling mechanism for advancing the tape from the recording position of said recorder to and across said support, means responsive to a predetermined selective operation of said recorder, preceding an interrruption in the operation thereof, for controlling said pulling mechanism to advance the last recorded character onto said support, timing means comprising a rotary element, means for moving the said element from a normal position to an operated position and a contact closed by said element in its operated position, the period of movement of said rotary element from its normal to its operated position being substantially equal to the period required to advance the tape from recording position onto said support and electro-magnetic means controlled by said contact upon the closure thereof for rendering said tape pulling mechanism ineffective to advance the tape.

4. In combination, a tape recorder, a support, a tape pulling mechanism for advancing the tape from the recording position of said recorder to and across said support, means responsive to all interruptions in the operation of the recorder excepting those following a predetermined selective operation thereof, for rendering the tape pulling mechanism ineffective to advance the tape during such idle period of the recorder, and timing means controlled by said predetermined selective operation of said recorder, said timing means comprising a rotary element, means for moving said element from a normal position to a tape arresting position, over a period of time not less than the period required to advance the tape from recording position onto said support, said element in the tape arresting position acting to render the tape pulling mechanism ineffective to further advance the tape, and means operative on a subsequent different selective operation of said recorder for returning said element to normal position.

5. In combination, a tape recorder, a support, a tape pulling mechanism for advancing the tape from the recording position of said recorder to and across said support, means responsive to all interruptions in the operation of the recorder excepting those following a predetermined selective operation thereof, for rendering the tape pulling mechanism ineffective to advance the tape during such idle period of the recorder, and timing means operative upon said predetermined selective operation of said recorder, said timing means comprising a rotary element, means for moving said element from a normal to an operated position, a contact closed by said element in its operated position, the period of rotation thereof from normal to operated position being substantially equal to the period required to advance the tape from recording position onto said support, electromagnetic means controlled by said contact upon the closure thereof for rendering said tape pulling mechanism ineffective to further advance the tape, and means operative on a subsequent different selective operation of said recorder for returning said element to normal position.

6. In combination, a recorder, a tape feeding device for advancing tape beyond said recorder for observation in a continuous and uniform movement during the printing of successive char-

acters, means for arresting the movement of the tape upon all interruptions of operation of the recorder excepting those following a predetermined selective operation thereof, and rotary motor driven means responsive to said predetermined selective operation of said recorder for arresting the movement of the tape after the last printed character has been advanced a predetermined distance beyond said recorder.

7. In combination, a recorder, a tape feeding device for advancing the tape beyond said recorder for observation in a continuous and uniform movement during the printing of successive characters, means for arresting the movement of the tape upon interruption of operation of the recorder excepting that following a predetermined selective operation thereof, timing means driven independently of said recorder, means responsive to said predetermined selective operation of said recorder for setting said timing means into operation and means controlled by said timing means after a predetermined period of time for interrupting the movement of the tape.

8. In combination, a recorder for stock quotations, a support, a tape pulling mechanism for advancing the tape across said support, means for normally stopping the movement of said tape across said support upon interruption of the operation of said recorder, a normally inactive timing mechanism driven independently of said recorder and means responsive to predetermined selective operation of said recorder for setting said timing mechanism into operation, said timing mechanism serving to delay the stopping of the tape until the last quotation recorded prior to said interruption has been advanced onto said support.

9. In combination, a support, a data recording device located at one side of the support, a tape pulling device located at the opposite side of the support and serving to draw the tape in a continuous movement through said data recording device and across said support, when said data recording device is printing successive characters, means for normally stopping the movement of the tape immediately upon interrupting of the operation of the recording device, said means being ineffective to stop the tape upon interruption of the operation of the recording device following the reception of a predetermined selective condition, and means controlled by said recording device upon reception of said predetermined selective condition and driven by said tape pulling mechanism for effecting stopping of the tape after the last printed character has been advanced onto said support.

10. In combination, a tape recorder, a support, a tape pulling mechanism for advancing the tape across said support, electromagnetic operating means for effecting stopping of the tape, contact means operated by said recorder for normally energizing said electromagnetic means substantially immediately upon interruption of the operation of the recorder, said contact means being ineffective to cause energization of said electromagnetic device upon reception of a predetermined selective condition by the recorder and separate contact means driven by said tape pulling mechanism and operating a predetermined time after the reception of said last predetermined selective condition for energizing said electromagnetic means to effect stopping of the tape.

11. In combination, a tape recorder, a support, a tape pulling mechanism for advancing the tape across said support, means for effecting stopping of the tape, control means operated by said recorder for normally operating said first means immediately upon each interruption of the operation of the recorder, said control means being ineffective to operate said first means upon interruption of the recorder following the reception of a predetermined selective condition by the recorder and separate control means driven by said tape pulling mechanism and operating a predetermined time after the reception of said last predetermined selective condition for operating said first means to effect stopping of the tape.

12. In combination a tape recorder, a support, a tape pulling mechanism for advancing the tape across said support, means for effecting stopping of the tape, control means operated by said recorder for normally operating said first means immediately upon each interruption of the operation of the recorder, said control means being ineffective to operate said first means upon reception of a predetermined selective condition by the recorder and a second control means operating from a normal position to a second position on each reception of said predetermined selective condition and returnable to said normal position upon the reception of the first selection of a different kind following said predetermined selective operation, said second control means when operated to its second position serving to operate said first means to effect stopping of the tape.

ERNEST W. HEWITT.
GEORGE I. ROBERTS.