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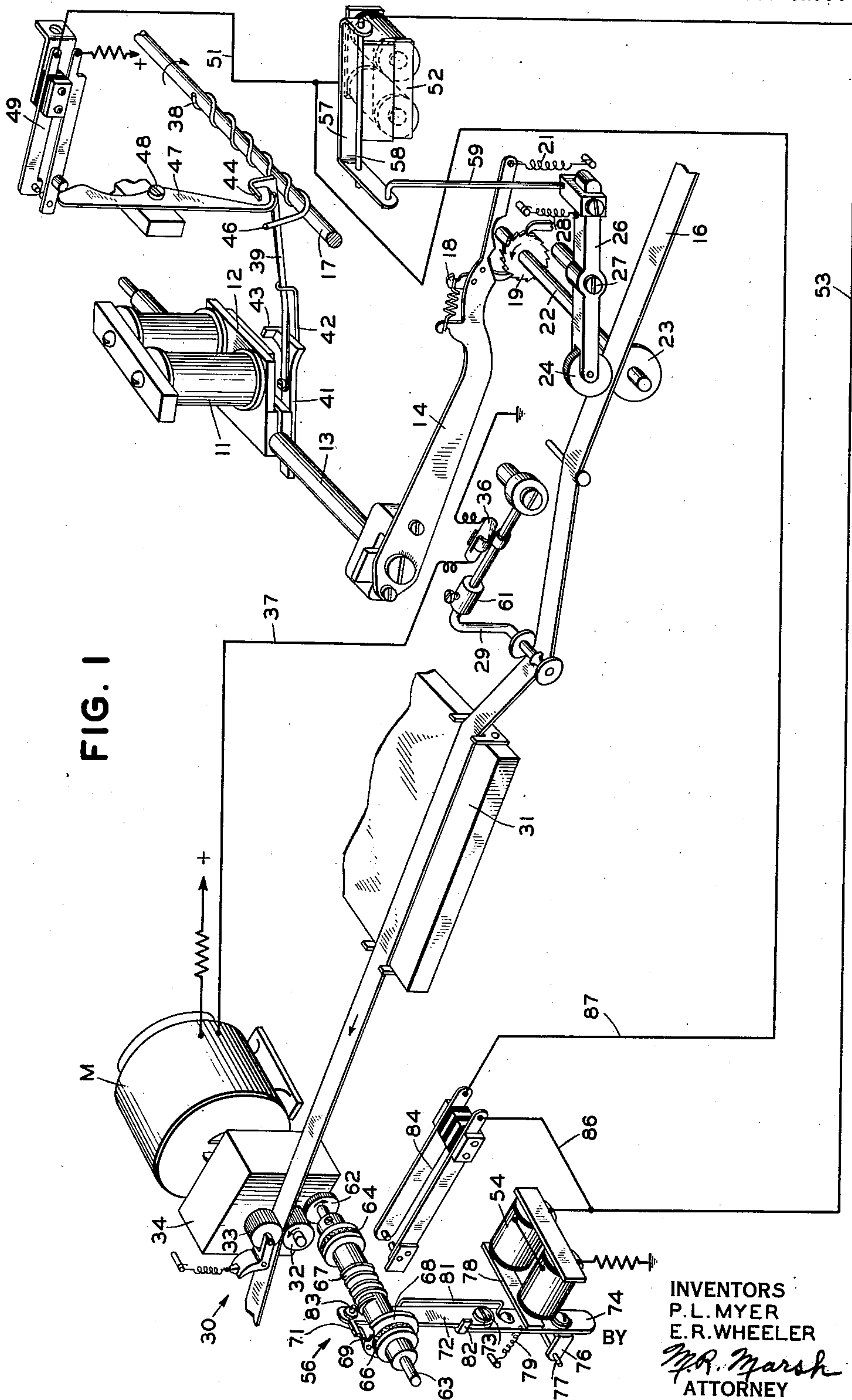
P. L. MYER ET AL

2,212,947

CONTROL FOR TAPE PULLERS

Filed Oct. 4, 1938

2 Sheets-Sheet 1



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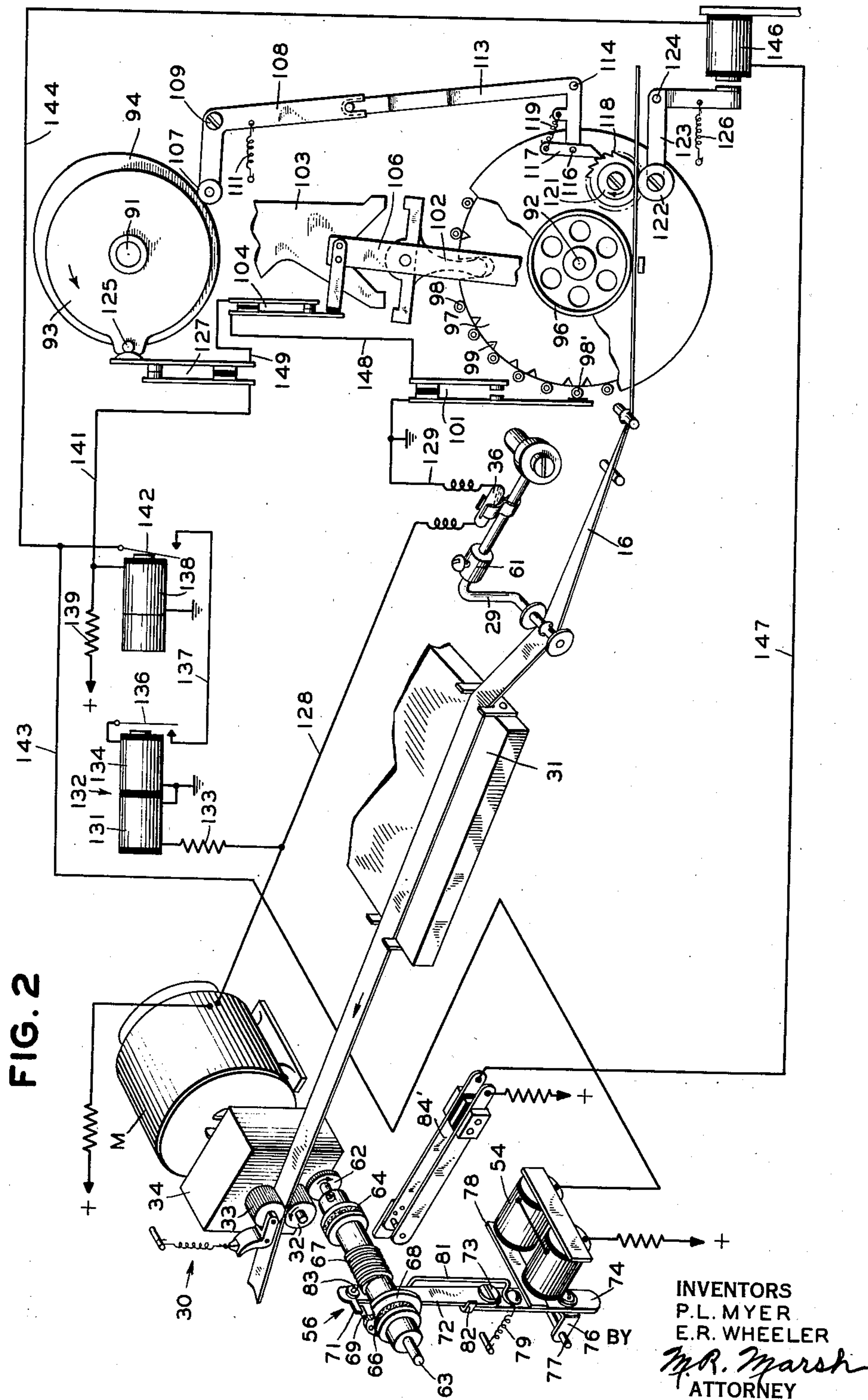
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**2,212,947**

# CONTROL FOR TAPE PULLERS

Filed Oct. 4, 1938

2 Sheets-Sheet 2





## UNITED STATES PATENT OFFICE

2,212,947

## CONTROL FOR TAPE PULLERS

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Application October 4, 1938, Serial No. 233,210

20 Claims. (Cl. 178—42)

This invention relates primarily to a control for ticker tape pullers and more particularly to a device for automatically feeding a predetermined length of blank tape through a stock quotation printing machine or ticker whenever the operation thereof ceases for a predetermined length of time.

In stock quotation tickers of the type now in general use, the last quotation character printed on the ticker tape is generally so close to or beneath the typewheel that it is difficult or impossible for an observer watching the ticker to read the last few characters printed. In order to eliminate this condition, the operator at the transmitting station usually transmits a series of letters dots whenever there are no more stock quotations to transmit for the time being. Each letters dot thus transmitted advances the ticker tape through the ticker one letter space and permits the last quotation character to be advanced from beneath the typewheel to a position where it can be readily seen by an observer.

As is well known in the art, where stock tickers are used in conjunction with projectors which enlarge and project the characters on the ticker tape on to a screen where they can be observed by a large number of people, the tape has to be advanced a considerable amount or a considerable number of letters dots transmitted before the last printed quotation character is in the projecting field. The number of letters dots necessary to advance the ticker tape so that the last printed quotation character is in the projecting field is considerably more than the number necessary to advance the ticker tape so that the last quotation character can be observed in a ticker not employed in conjunction with a projector. Usually the tickers operating in conjunction with the projecting mechanisms and those which do not are controlled from a central transmitter. Therefore if the operator at the transmitting point transmits a sufficient number of letters dots to advance the ticker tape so that the last printed quotation character is in the projecting field on those tickers associated with projecting machines, the tape in the tickers not associated with projecting machines is advanced a considerable amount more than is necessary. Obviously such an arrangement constitutes a waste of the ticker tape at the tickers not employed in projecting machines and is annoying to observers at such tickers.

In view of the above, one of the objects of the invention is to provide an improved and simplified control for ticker tape pullers which may be

associated with projecting machines so that when the ticker comes to rest for the time being, the associated ticker tape continues to be advanced until the last printed quotation character is brought into the projecting field.

Another object of the invention is to decrease the waste of ticker tape in the tickers that do not require the tape to be advanced as much as it does in those associated with projecting machines.

These and other objects of the invention will be apparent from the following detailed description thereof and claims when taken in conjunction with the accompanying drawings, in the latter of which

Fig. 1 is a schematic perspective view of a tape puller, a projecting field and the necessary elements of a ticker commonly known as a step-by-step or self-wind type and associated apparatus together with the circuits extending therebetween and adapted to control the tape puller in accordance with the invention; and

Fig. 2 is a diagrammatic perspective view of a tape puller, a projecting field and the necessary elements of what is known in the art as the 5A or high speed ticker and associated apparatus together with a modification of the cooperating control circuits.

Although the control circuits in Figs. 1 and 2 are shown associated with a self-wind ticker and a high speed ticker, respectively, it will be obvious hereinafter that with obvious changes each one of the control circuits could be employed with the other type of ticker.

Referring first to Fig. 1, only the elements and apparatus of a self-wind ticker are shown that are thought necessary for a complete understanding of the invention and as the operation of these elements are generally known in the art, the description thereof and their operation will be limited to the extent to which they cooperate with and affect the elements of the invention.

As is well known, the printing operation is performed by a press magnet 11 which when energized moves its associated armature 12 so that the shaft or pivot rod 13 to which the armature is attached is pivoted a slight amount in a counter-clockwise direction. As the rod 13 pivots, a press arm or lever 14, attached to the forward end of the rod, moves upward and actuates print hammers (not shown) to press the paper ticker tape or recording medium 16 against the typewheel. The typewheel is not shown in order to more clearly illustrate the other parts of the printer, but, as is well known in the art, it is



attached for rotation therewith to the typewheel shaft 17. As the press arm 14 moves upward a spring biased pawl 18, movable therewith, also moves upward and engages a higher tooth on a ratchet 19 so that when the press magnet 11 is subsequently deenergized, a spring 21 attached to the press arm 14 pivots it in a clockwise direction back into its normal position and the pawl 18 rotates the ratchet 19 one tooth. The ratchet 19 is fixed to a feed roller shaft 22 which has fixed adjacent its forward end a feed roller 23. The tape 16 is adapted to engage the top of the feed roller 23 and it is normally held in engagement therewith by a pressure roller 24. The pressure roller 24 is carried on the left hand end of a lever 26 pivotally mounted adjacent its center on a screw 27. A spring 28 attached to the lever 26 normally presses the roller down on to the tape 16 and holds it in engagement with the periphery of the feed roller 23. Thus each time the press arm 14 returns to its normal position it rotates the feed roller 23 a predetermined amount which in turn advances the tape 16 toward the left one letter space. Ordinarily a ticker of this type operates in this fashion to advance the ticker tape 16 one letter space in conjunction with each printing operation. However, as will be fully described hereinafter, the tape 16 is advanced at predetermined times in a different manner.

As the tape 16 leaves the ticker it passes under a tape lever 29 then across a projecting field, indicated in general by reference numeral 31, to the take-up or feed roller 32 of a motor driven tape puller indicated in general by reference numeral 30. A spring biased pressure roller 33 holds the tape 16 in engagement with the take-up roller 32 so that as the take-up roller 32 rotates, the tape is pulled across the projecting field 31. The take-up roller 32 derives its rotative force from a motor M of suitable size through a reduction gear box 34 which reduces the speed of the take-up roller 32 to the desired amount. The circuit to the motor M is controlled by a mercury switch, such as 36, on the tape lever 29 in a manner which will be hereinafter described. One side of the mercury switch 36 is connected to ground and the other is connected by a conductor 37 to one terminal of the motor M, the other terminal of the motor M being connected through a suitable resistance to battery. After the tape 16 is advanced through the ticker a sufficient number of letter spaces it forms a loop between the ticker and the projecting field 31 which allows the tape lever 29 to pivot in a counter-clockwise direction. This allows the mercury switch 36 to complete the circuit to the tape puller motor M whereupon it rotates and by means of the take-up roller 32 draws the tape 16 across the projecting field 31. The tape puller is normally adapted to pull the tape 16 a slight amount faster than it is fed through the ticker and therefore when the tape puller motor is running at its normal speed and the ticker operating, the size of the loop of tape between the ticker and the projecting field 31 normally decreases at a slow rate. As the size of the tape loop decreases the tape lever 29 is pivoted in a clockwise direction so that the mercury switch 36 moving therewith opens the circuit to the tape puller motor M, slowing down the tape puller and allowing the size of the tape loop to increase. With the ticker operating at a normal speed, the tape 16 is advanced through the ticker at such a rate that the loop at the tape lever

29 will be large enough to permit the tape lever to complete the circuit to the tape puller motor M before it has completely stopped. Thus the movement of the tape 16 across the projecting field 31 normally continues while the printer is in operation, the operation of the tape lever 29 in opening the tape puller motor circuit merely acting to decrease the rate of movement of the tape past the projecting field. Thus when the tape puller motor circuit is opened the inertia of the tape puller motor armature normally continues to move the tape at an ever decreasing rate of speed until the tape lever 29 again completes the motor circuit. When the ticker does stop advancing the tape therethrough for a time the tape puller motor slows down and finally stops with a small loop of tape at the lever 29.

As is well known in the art, the self-winding tickers of the above mentioned type invariably employ a unison device which enables all the tickers on a circuit to start together from a common position. This device consists primarily of a worm 38 on the type wheel shaft 17 and a cooperating follower or unison lever 39. The unison lever 39 is pivotally supported on a member 41 movable with the press magnet pivot rod 13 and has an associated spring 42 which normally biases the lever toward the beginning of the unison worm 38. Each time the press magnet 11 operates the unison lever 39 is lifted out of engagement with the worm 38 whereupon the spring 42 pivots it toward the beginning of the worm against a stop 43. When the press mechanism returns to its normal position, the unison lever 39 reengages the worm 38. The worm 38 and the unison lever 39 are so arranged that when the type wheel shaft 17 makes three complete revolutions following a print impulse, the unison lever 39 will be advanced sufficiently on the worm 38 so that a bent end 44 of the unison lever is engaged by the radially extending end 46 of the worm 38. This prevents further rotation of the type wheel shaft 17 and the escapement impulses have no further effect on the typewheel shaft 17. All the tickers on a circuit are similarly arranged and when the type wheels thereof are stopped in this manner, all the unison dots thereon will be in printing position, thus all the tickers are brought into unison and are ready to start together. With the tickers all stopped in unison position, the next press impulse raises the unison lever 39 from out of engagement with the worm 38 and allows the spring 42 to return it to the beginning of the worm, thus freeing the type wheel shaft.

Let it be assumed that the ticker ceases printing for the time being and that the escapement impulses continue to advance the type wheel shaft 17 until it is stopped by the unison lever 39 as hereinbefore described. Just as the unison lever 39 is about to engage the end of the worm 46, it first engages a substantially vertical lever 47 which is pivoted adjacent its center on a shoulder screw 48 supported in a bracket attached to the frame. This engagement pivots the lever 47 and causes it to close a normally open contact 49 associated with the upper end thereof. The tongue of contact 49 is connected through a suitable resistance to battery and the associated back stop is connected by a conductor 51 through the coils of a magnet 52, a conductor 53, and through the coils of another magnet 54 to ground, thus as the contact 49 is closed the magnets 54 and 52 are energized. The magnet 54 is associated with a so-called metering device indicated in general



by reference numeral 56, which is associated with the tape puller. As the magnet 52 is energized, it pivots a bell crank 57 pivotally supported on a rod 58 and causes an associated push rod 59 to move in a downward direction. The push rod 59 is attached to the right hand end of the pressure roller lever 26 and as it moves downward, it lifts the pressure roller 24 off the tape 16. This frees the tape 16 at the ticker and allows the tape lever 29, assisted by an adjustable weight 61 thereon to pivot and form a larger loop in the tape by pulling it through the ticker. This pivoting of the tape lever 29 allows the mercury switch 36 to complete the circuit to the tape puller motor M whereupon it resumes the pulling of the tape 16 across the projecting field 31. At the time the tape 16 is freed in the ticker, the tape puller motor M is usually stopped, because by the time the ticker runs to unison the tape loop will have pivoted the tape lever 29 and thus opened the motor circuit, however it may still be advancing the tape due to the presence of a large tape loop or the inertia of the motor armature. Whatever the condition of the tape puller motor however when the tape is released in the ticker, it begins or continues to advance the tape until stopped as will be described in following paragraphs.

The metering device 56 consists of a roller 62 which is in engagement with the take-up roller 32 of the tape puller and normally rotates with the feed roller. The roller 62 is fixed for rotation to a shaft 63 which through friction elements such as 64 and 66 also on the shaft tends to rotate a worm 67. The worm 67 has formed integral therewith a flange 68 which carries an axially extending pin 69. Normally the pin 69 is engaged with a projection 71 of a lever 72 and thereby keeps the worm 67 at rest in a normal rest position against the action of the friction elements 64 and 66. The lever 72 is pivoted on a shoulder screw 73 carried in a second lever 74 attached to a bracket 76 pivotally mounted on a rod 77. Attached to the second lever 74 is the armature 78 associated with the magnet 54 and when the magnet is energized, the levers 72 and 74 pivot a slight amount in a clockwise direction about the rod 77 against the action of an attached spring 79. A spring 81 is secured to the second lever 74 and normally holds the lever 72 over against a stop 82 on the lever 74. When the magnet 54 is energized, the lever 72 withdraws or moves the projection 71 from engagement with the pin 69 on the flange 68 thereby allowing the worm 67 to rotate with the shaft 63. This movement of the lever 72 also moves a follower 83 at the upper end of the lever which is normally out of engagement with the worm 67 into engagement therewith whereupon the lever 72 begins to pivot about the screw 73 as the worm 67 rotates and the follower 83 moves therealong. After the lever 72 has followed along the worm 67 a predetermined distance, it engages the tongue of a normally open contact 84 to close the same. The contact 84 is connected by conductors 86 and 87 around the coils of the magnet 52 and as the contact is closed, the magnet 52 is short-circuited. Short-circuiting the magnet 52 allows the pressure roller 24 to press down on the feed roller 23 and stop the movement of the tape through the ticker. As the movement of the tap through the ticker is stopped, the tape loop at the tape lever 29 decreases and pivots the tape lever so that the mercury switch 36 thereon opens the circuit to the tape puller motor

M and the movement of the tape across the projecting field 31 comes to a gradual stop. The amount of movement of the follower 83 along the worm 67 necessary to close the contact 84 is so determined that with a normal size tape loop at the tape lever 29, the contact is not closed until the tape has been advanced sufficiently to bring the last printed quotation to the beginning of the projecting field 31. Thus a predetermined length of tape is pulled across the projecting field when the ticker stops printing for a length of time, the length of tape usually being sufficient to advance the last printed character on the tape 16 into the beginning of the projecting field. On the next printing operation of the ticker the unison lever 39 is withdrawn from the worm 38 which allows the contact 49 to open which in turn opens the circuit to the metering device magnet 54. This allows the spring 79 to withdraw the worm follower 83 from engagement with the worm 67 whereupon the spring 81 returns the lever 72 to its normal position with the projection 71 in the path of the pin 69 where it will engage the pin and stop the rotation of the worm in its normal rest position.

It will be obvious that if a press impulse is received during the interval that the tape puller 30 is advancing blank tape through the ticker and the follower 83 is moving along the worm 67, the energization of the press magnet 11 withdraws the unison lever 39 from engagement with the unison worm 38 whereupon the contact is allowed to open. The opening of contact 49 breaks the circuit to the magnets 52 and 54 allowing them to become deenergized. As magnet 52 is deenergized, the pressure roller 24 again engages the tape 16 and stops the free movement thereof through the ticker while the deenergization of the magnet 54 permits the withdrawal of the follower 83 from engagement with the worm 67 and allows the lever 72 to return to its normal position. From the above description it can be seen that after a ticker of this type runs to unison, the tape puller 30 is operated so that a predetermined or metered length of the ticker tape is pulled across the projecting field 31. This metered length of ticker tape is usually sufficient to bring the last printed character on the ticker tape to the beginning of the projecting field, and in this manner observers watching the associated projector are permitted to view the last printed character as the tape loop between the ticker and the projecting field has no characters printed thereon. By stopping the worm 67 in a predetermined stopping position by means of the pin 69 on the flange thereof engaging the projection 71 of the lever 72, a substantially uniform amount of rotation of the worm is necessary before the lever closes the contact 84 to stop the free movement of the tape through the ticker. If the worm 67 was not stopped in a uniform stopping position, at times it would require varying amounts of rotation thereof before the follower 83 would drop into the worm. For such conditions, the tape puller 30 would advance a greater amount of tape and the last printed quotation on the tape would not stop at the same place in the projecting field 31.

Referring now to Fig. 2, which shows a modification of the elements of the invention and the manner in which they cooperate with a ticker of the 5-A type, it will be noted that a tape puller, a metering device, a projecting field and a tape lever similar to those shown in Fig. 1 are associated therewith and the elements thereof bear



the same reference numerals in both figures. A complete description of the operation of the 5-A ticker is not necessary for a thorough understanding of the operation of the invention, and only the parts or elements thereof which directly cooperate with the invention will be briefly described. A more detailed description of the operation of this type of ticker is given in a patent to Morton et al., No. 1,821,110, issued September 1, 1931.

Referring to Fig. 2, the ticker employs two parallel shafts 91 and 92, the former carrying the selecting cam drum (not shown) and an operating cam 93 having an external cam face 94. The shaft 92 carries the typewheel 96 and surrounding this shaft is a series of five notched code discs 97, one only of which is shown, with which an annular group of typewheel stop pins 98 cooperate. The stop pins 98 are normally held in an outward position by the normal peripheries of the discs 97, but in each combination in which the discs may be set, a notch such as 99 therein is in alignment with a notch in each of the other discs and opposite one of the stop pins 98. This permits this stop pin 98 to move radially inward and in so doing determines the printing position of the typewheel 96.

Associated with one of the stop pins 98' is the tongue of a normally open contact 101. When the stop pin 98' is selected or allowed to move inward, the contact 101 closes and when another stop pin is selected, as the result of a different setting of the code discs 97, the stop pin 98' moves outward and opens the contact 101.

The code discs 97 are selectively positioned into one of two positions by transfer levers 102 cooperating with individual associated selecting levers 103 positioned in various code combinations of settings by the selector cam (not shown) on the shaft 91. A contact 104 is so arranged that it is adapted to be operated by the shift lever 106 of the printer, the contact being closed when the shift lever is in the "figures shift" position, as shown, and open when the shift lever is in its opposite or "letters shift" position. As well known and described in the above mentioned patent to Morton, the shift lever 106 is operated by the sixth impulse added to each code group from one of the selector levers 103.

The cam 93 on the shaft 91 is adapted to make one revolution for each character printed and is stopped for an interval of time depending upon the interval between two successive code groups in its normal rest position, as shown. In the last half of a revolution of the cam 93, the hump portion thereof engages a cam follower 107 attached to one end of a bell crank 108 pivoted at 109 to pivot the bell crank in a counter-clockwise direction against the action of its attached spring 111. The depending arm of the bell crank 108 is bifurcated and engages a pin carried in the end of an upwardly extending arm of another bell crank 113. The bell crank 113 is pivoted at 114 and pivotally carries at 116 on the end of its leftwardly extending arm a pawl 117. The pawl 117 is associated with a ratchet 118, held in engagement therewith by a spring 119, and each time the bell cranks 108 and 113 are actuated the ratchet 118 is rotated a predetermined amount.

A tape feed roller 121 is adapted to rotate with the ratchet 118 and is positioned above the ticker tape 16. A pressure roller 122 located beneath the ticker tape and on the leftwardly extending arm of a bell crank 123 normally presses the tape against the feed roller 121. The bell crank 123

is pivoted at 124 and is biased in its normal position by an attached spring 126. Thus each time the cam 93 rotates in conjunction with each received code combination, the ticker tape 16 is advanced toward the left an amount equal to one letter space. A reel (not shown) located to the right of the typewheel 96 supplies the ticker tape.

In the normal rest position of the cam 93, (as shown) a pin 125 therein is adapted to engage the tongue of a contact 127 and hold the contact in a closed position and during the rotation of the cam 93 the contact 127 is allowed to open.

The control circuits extending between the various elements of the ticker, tape puller, metering device, together with their associated controlling relays and magnets will now be described. In the following description the elements of the metering device and the tape control lever which appear in Fig. 1 and Fig. 2 are referred to by the same reference numerals such as the mercury switch 36, the tape lever 29, the lever 72, the worm 83, etc. However, as the circuits thereto are different in Fig. 2 the associated conductors are referred to by different reference numerals and the normally open contact 84 in Fig. 1 is normally closed in Fig. 2, being referred to by reference numeral 84'.

One of the motor terminals is connected to battery and the other connected by a conductor 128 through mercury switch 36 and over a conductor 129 to ground. In parallel with the mercury switch 36 is the left hand or operating coil 131 of a double coil relay 132 in series with a comparatively high resistance 133. One terminal of the right hand or holding coil 134 of the relay 132 is connected to ground and the other side of the coil is connected to the associated tongue 136. The make stop associated with the tongue 136 is connected by a conductor 137 to the break stop of a relay 138. The relay 138 is a slow acting relay and being of the type which makes quickly and breaks slowly. One side of the coil 138 is grounded and the other is connected through a resistance 139 to positive potential. Also connected to the battery side of the coil 138 is a conductor 141 leading to the contact 127 in series with contacts 104 and 101, the opposite side of the last contact 101 being grounded. The tongue 142 of the relay 138 is connected by a conductor 143 through the coil of the metering device magnet 54 to battery in parallel with another circuit comprising a conductor 144 leading to the coil of a magnet 146 associated with the pressure roller bell crank 123 and continuing over a conductor 147 through the normally closed contact 84' to battery. Under normal operation of the ticker, the tape 16 is advanced one letter space in conjunction with each printed character or each cycle of operation thereof. The tape forms a loop adjacent the tape lever 29 and after the loop has reached a certain size, the tape lever pivots sufficiently to allow the mercury switch 36 to complete the motor circuit whereupon the tape puller advances the tape across the projecting field 31. The tape puller normally advances the tape across the projecting field slightly faster than it is normally advanced through the ticker and therefore the size of the loop tends to decrease, and after it has decreased to a predetermined size, the mercury switch 36 opens the tape puller motor circuit and the rate of movement of the tape across the projecting field decreases until the mercury switch is again closed to again complete the motor circuit. The resistance 133 in series with the coil 131 of the relay 132, both



of which are in parallel with the mercury switch 36, is of such high value that when the mercury switch is open, there is not sufficient current flowing through the tape puller motor M for it to operate. However, with the mercury switch 36 open, the current flowing through the resistance 133 and relay coil 131 is sufficient to operate the relay 132. Obviously, when the circuit through the mercury switch 36 is completed, the coil 131 is short-circuited and the relay 132 assumes an unoperated position. Thus the relay 132 is operated each time the circuit through the mercury switch 36 is broken, the relay assuming an unoperated position when the circuit through the mercury switch is completed. The slow acting relay 138 is normally in an operated condition and therefore the circuit through the right hand coil 134 of the relay 132 is open at the tongue 142.

Now let it be assumed that there are no more quotations to be transmitted and the ticker is to be idle for a length of time and that the last character transmitted was a figures dot. The figures dot, as well known in the art, being a dot or period printed in the portion of the tape wherein the figures are recorded, such dots being similar to letters dots appearing in the section of the tape reserved for letters, the difference in the dots being distinguished by their location on the tape. For such a condition of the ticker as hereinbefore described, the stop pin 98' is allowed to move toward the typewheel shaft and close the contact 101 which applies ground over a conductor 148 to the tongue of the contact 104. With the ticker stopped in the "figures shift" position, the contact 104 is closed and the ground is continued over a conductor 149 to the tongue of contact 127. When the ticker is stopped in its normal rest position, the contact 127 is closed and the ground circuit is continued over conductor 141 to the battery terminal of the coil of relay 138. This grounded circuit short-circuits the coil of the relay 138 and allows the tongue 142 thereof to make with its break stop. The relay 138 is a slow breaking relay and therefore the tongue 142 does not operate for an appreciable length of time until after the coil is short-circuited, and this condition is further accentuated by short-circuiting the coil instead of opening it. A slow release relay 138 is employed so that the circuit at its tongue 142 is completed only when a figures dot combination is received and is not followed immediately by other combinations. The movement of the tongue 142 of relay 138 to an unoperated position completes a circuit through the holding coil 134 of relay 132, the tongue 136 and associated make stop, the conductor 137, break stop and tongue 142 of relay 138 over conductor 143 through the coil of magnet 54 to battery in parallel with another circuit from the tongue 142 over conductor 144 through the coil of magnet 146, over conductor 147 and through the normally closed contact 84' to battery. For the above circuits it is assumed that the circuit through the mercury switch 36 is open and therefore the left hand coil 131 of relay 132 will be energized to operate the relay 132. However, in the event that the relay 132 is not operated by the coil 131 at the time the relay 138 assumes an unoperated position, the above described circuits to the magnets 54 and 146 will be completed when the circuit through the mercury switch is broken. The circuits to the magnets 54 and 146 operate the same, and as

magnet 146 operates it withdraws the pressure roller 122 from engagement with the tape 16 and feed roller 131. This frees the tape in the ticker and the weighted tape lever 29 pulls the blank tape through the ticker forming a loop and allowing the mercury switch 36 to complete its circuit to the tape puller motor M. The tape puller motor M thereupon starts up and pulls more blank tape through the ticker until stopped as hereinafter described. The energization of the magnet 54 releases the metering worm 67 and starts the follower 83 therealong, and after the follower has advanced a predetermined distance on the worm, the lever 72 engages the tongue of contact 84' and opens the same. This opens the circuit through magnet 146 allowing the pressure roller to assume its normal position and stop the movement of the blank tape through the ticker whereupon the tape puller 30 which at this time is continuing to advance the tape across the projecting field, decreases the size of the tape loop at the tape lever and opens the circuit through the mercury switch 36. As the circuit to the tape puller motor is thus broken, the movement of the tape gradually ceases with the last printed character at the beginning of the projecting field 31.

When the mercury switch 36 operates to complete the circuit to the tape puller motor to advance the blank tape through the ticker, the relay 132 does not assume an unoperated position because it is locked in an operated position by the circuit through its right hand coil 134 hereinbefore described.

It will be noted that the modification disclosed in Fig. 2 differs from that in Fig. 1 in that the metering of the blank tape is not initiated unless the circuit through the mercury switch 36 is broken or until it is broken by the normal operation of the tape puller. Thus the amount of blank tape advanced through the ticker on each cycle of operation of the metering device 56 is substantially the same and the last printed character on the tape invariably stops at approximately the same position in the projecting field.

When the ticker resumes normal operation, the short-circuiting circuit to the coil of the relay 138 is broken and almost immediately thereafter, due to the quick making characteristic of the relay 138, the tongue 142 assumes an operated position. This operation opens the circuit to the right hand or holding coil of relay 132 whereupon it is again placed under the control of its left hand or operating coil 131. The movement of the tongue 142 of relay 138 to its operated position also opens the circuit to the metering device magnet 54 which allows the spring 79 to withdraw the follower 83 from the worm 67 and the spring 81 to return the lever 72 to its normal position with the projection 71 in the path of the pin 69 to stop the worm in its normal stop position.

Obviously if the ticker should start operating during the time blank tape is being pulled past the typewheel 96, the short circuit around the relay 138 is opened which allows the relay to quickly operate and open the circuit through the magnets 54 and 46, thus restoring the system to normal.

It will be obvious, of course, that various other modifications of the invention may be made to accomplish the same results without departing from the spirit or essential attributes



thereof, and it is desired, therefore, that only such limitations shall be placed thereon as are imposed by the prior art or are specifically set forth in the appended claims.

5. What is claimed is:

1. In combination, a tape recorder, a support, a tape, a tape advancing mechanism associated with said recorder normally operative to advance said tape therethrough a predetermined amount concomitantly with each operation thereof, said tape advancing mechanism comprising a rotatable feed roller and a pressure roller pressing said tape onto said feed roller; a tape pulling mechanism normally pulling said tape across said support as advanced by said recorder tape advancing mechanism, means responsive to predetermined selective operation of said recorder for disabling said recorder tape advancing mechanism by lifting said pressure roller off said feed roller and rendering said tape pulling mechanism operative to advance said tape and means dependent on the amount of tape advanced across said support by said tape pulling mechanism after the disabling of said recorder tape advancing mechanism for rendering said tape pulling mechanism inoperative.

2. In combination, a tape recorder, a support, a tape, a tape advancing mechanism associated with said recorder normally operative to advance said tape a predetermined amount concomitantly with each operation thereof, said tape advancing mechanism comprising a rotatable feed roller and a pressure roller pressing said tape onto said feed roller, a tape pulling mechanism normally pulling said tape across said support as advanced by said recorder tape advancing mechanism, means operative a predetermined length of time after the last selecting operation of said recorder for disabling said recorder tape advancing mechanism by lifting said pressure roller off said feed roller and rendering said tape pulling mechanism operative and means controlled by the amount of operation of said tape pulling mechanism after the disabling of said recorder tape advancing mechanism for rendering said tape pulling mechanism inoperative.

3. In combination, a tape recorder, a support, a tape, a tape advancing mechanism associated with said recorder normally operative to advance said tape a predetermined amount concomitantly with each operation thereof, a loop in said tape, a tape pulling mechanism normally pulling said tape across said support as advanced by said recorder tape advancing mechanism, circuit controlling means operated by the variation of size of said loop for controlling the operation of said tape pulling mechanism, means responsive to a predetermined selective operation of said recorder for disabling said recorder tape advancing mechanism and changing the size of the loop in said tape to render said tape pulling mechanism operative and means determined by the amount of tape advanced by said tape pulling mechanism after the disabling of said recorder tape advancing mechanism for stopping the operation of said tape pulling mechanism.

4. In combination, a tape recorder, a support, a tape, a tape advancing mechanism associated with said recorder normally operative to advance said tape a predetermined amount concomitantly with each operation thereof, a loop in said tape, a tape pulling mechanism normally pulling said tape across said support as advanced by said recorder tape advancing mechanism, circuit controlling means operated by the variation of size

of said loop for controlling the operation of said tape pulling mechanism, means operative a predetermined length of time after the last operation of said recorder for disabling said recorder tape advancing mechanism and changing the size of the loop in said tape to render said tape pulling mechanism operative and means dependent on the amount of tape advanced by said tape pulling mechanism after the disabling of said recorder tape advancing mechanism for stopping the operation of said tape pulling machine.

5. In combination, a recorder, a support, a tape, a tape advancing mechanism associated with said recorder normally operative to advance said tape a predetermined amount concomitantly with each operation thereof, a loop in said tape, a tape pulling mechanism normally pulling said tape across said support as advanced by said recorder tape advancing mechanism, circuit controlling means operated by the variation of size of said loop for controlling the operation of said tape pulling mechanism, means responsive to a predetermined selective operation of said recorder for feeding said tape at said recorder tape advancing mechanism and changing the size of the loop in said tape to render said tape pulling mechanism operative and means dependent on the amount of tape advanced past said recorder tape advancing mechanism following the freeing of said tape at said recorder tape advancing mechanism for rendering said tape pulling mechanism inoperative.

6. In combination, a recorder, a support, a tape, a tape advancing mechanism associated with said recorder normally operative to advance said tape a predetermined amount concomitantly with each operation thereof, a loop in said tape, a tape pulling mechanism normally pulling said tape across said support as advanced by said recorder tape advancing mechanism, circuit controlling means operated by the variation of size of said loop for controlling the operation of said tape pulling mechanism, means operative a predetermined length of time after the last operation of said recorder for freeing said tape at said recorder tape advancing mechanism and changing the size of the loop in said tape to render said tape pulling mechanism operative and means controlled by the amount of free tape advanced past said recorder tape advancing mechanism for rendering said tape pulling mechanism inoperative.

7. In combination, a recorder for recording on a recording tape, a support, a tape stepping mechanism associated with said recorder for stepping said tape therethrough a predetermined amount concomitantly with each operation, said tape stepping mechanism normally preventing movement of said tape through said recorder between operations thereof, a tape pulling mechanism normally operative to advance the tape stepped through said recorder across said support and means responsive to predetermined selective operation of said recorder for disabling said tape stepping mechanism in preventing movement of said tape through said recorder and rendering said tape pulling mechanism operative to advance said tape until the last recorded character thereon has been advanced on to said support.

8. In combination, a recorder for recording on a tape, a support, a tape stepping mechanism associated with said recorder for stepping said tape therethrough a predetermined amount concomitantly with each operation, said tape stepping mechanism normally preventing movement of said



tape through said recorder between operations thereof, a tape pulling mechanism normally operative to advance the tape stepped through said recorder across said support and means operative following a period of predetermined length of inactivity of said recorder for disabling said tape stepping mechanism in preventing movement of the tape through said recorder and rendering said tape pulling mechanism operative until the last recorded character on said tape has been advanced on to said support.

9. In combination, a recorder for recording on a tape, a support, a tape stepping mechanism associated with said recorder for stepping said tape therethrough a predetermined amount concomitantly with each operation, said tape stepping mechanism normally preventing movement of said tape through said recorder between operations thereof, a tape pulling mechanism normally operative to advance the tape stepped through said recorder across said support, a time delay device, means responsive to predetermined selective operations of said recorder for simultaneously initiating the operation of said time delay device and to cause said tape stepping mechanism to release said tape for advancement through said recorder until the last recorded character on said tape has been advanced on to said support.

10. In combination, a recorder for recording stock quotations on a tape, a support, a tape stepping mechanism associated with said recorder for stepping said tape therethrough a predetermined amount concomitantly with each operation, said tape stepping mechanism normally preventing movement of said tape through said recorder between operations thereof, a tape pulling mechanism normally operative to advance the tape stepped through said recorder across said support and means responsive to predetermined selective operations of said recorder for disabling said tape stepping mechanism in preventing movement of said tape through said recorder and rendering said tape pulling mechanism operative to advance said tape until a predetermined length of blank tape has been advanced through said recorder.

11. In combination, a recorder for recording stock quotations and the like on a recording tape, a support, a tape stepping mechanism associated with said recorder for stepping said tape therethrough a predetermined amount concomitantly with each operation, said tape stepping mechanism normally preventing movement of said tape through said recorder between operations thereof, a tape pulling mechanism normally operative to advance the tape stepped through said recorder across said support and means operative following a period of predetermined length of inactivity of said recorder for disabling said tape stepping mechanism in preventing movement of the tape through said recorder and rendering said tape pulling mechanism operative until a predetermined length of blank tape has been advanced through said recorder.

12. In combination, a recorder for recording quotations on a recording tape, a support, a tape stepping mechanism for stepping said tape through said recorder a predetermined amount on each printing operation thereof, said tape stepping mechanism normally preventing movement of said tape through said recorder between operations thereof, a loop in said tape disposed between said support and said recorder, a tape puller disposed to the side of said support opposite from the said recorder, controlled by the varia-

tions in the size of said loop, said tape puller normally operating to decrease the size of said loop and said tape stepping mechanism operative to increase the size of said loop and means responsive to a predetermined selective operation of said recorder for disabling said tape stepping mechanism to free the tape in said recorder and change the size of said loop to render said tape pulling mechanism operative until the last recorded character on said tape is advanced on to said support, said last mentioned means being independent of the size of said loop at the time of said predetermined selective operation.

13. In combination, a tape recorder, a support, a tape, a tape advancing mechanism associated with said recorder normally operative to advance said tape a predetermined amount on each printing operation thereof, said tape advancing mechanism normally preventing movement of said tape through said recorder between operations, a loop of said tape disposed between said support and said recorder, a tape puller disposed on the opposite side of said support from said recorder and controlled by the variations in size of said loop, said tape puller normally operative to decrease the size of said loop and said tape advancing mechanism operative to increase the size of said loop, a normally inoperative tape metering device, means controlled jointly by predetermined conditions of said recorder and the size of said tape loop for freeing said tape advancing mechanism, conditioning said tape puller to pull tape across said support and initiating the operation of said tape metering device and means controlled by said tape metering device after a predetermined amount of tape has been pulled through said recorder for restoring said tape advancing mechanism to normal and stopping the operation of said tape puller with predetermined ones of the characters upon said tape in predetermined positions on said support.

14. In combination, a recorder, a support, a tape, a tape advancing mechanism associated with said recorder normally operative to advance said tape a predetermined amount concomitantly with each operation thereof, a tape pulling mechanism normally pulling said tape across said support as advanced by said recorder tape advancing mechanism, means responsive to predetermined selective operation of said recorder followed by a period of at least a predetermined length of inactivity thereof for freeing said tape at said recorder tape advancing mechanism and rendering said tape pulling mechanism operative and means conditioned by the amount of tape advanced by said tape pulling mechanism after the freeing of said tape at said recorder tape advancing mechanism for rendering said tape pulling mechanism inoperative.

15. In combination, a tape recorder, a support, a tape, a tape advancing mechanism associated with said recorder normally operative to advance said tape a predetermined amount concomitantly with each operation thereof, a loop in said tape, a tape pulling mechanism normally pulling said tape across said support as advanced by said recorder tape advancing mechanism, circuit controlling means operated by the variation of size of said loop for controlling the operation of said tape pulling mechanism, means responsive to a predetermined selective operation of said recorder for releasing said tape at said recorder tape advancing mechanism and changing the size of the loop in said tape to render said tape pulling mechanism operative and means



dependent on the amount of tape advanced past said recorder tape advancing mechanism following the releasing of said tape at said recorder tape advancing mechanism for rendering said tape pulling mechanism inoperative and restoring said recorder tape advancing mechanism to normal.

16. In combination, a recorder for recording quotations on a recording tape, a support, a tape stepping mechanism for stepping said tape through said recorder a predetermined amount on each printing operation thereof, said tape stepping mechanism normally preventing movement of said tape through said recorder between operations thereof, a loop in said tape disposed between said support and said recorder, a tape puller disposed to the side of said support opposite from the said recorder and controlled by the variations in the size of said loop, said tape puller normally operating to decrease the size of said loop and said tape stepping mechanism operative to increase the size of said loop, means operative following a period of predetermined length of inactivity of said recorder for disabling said tape stepping mechanism in preventing movement of said tape through said recorder and rendering said tape pulling mechanism operative, means operative after a predetermined length of tape has been advanced through said recorder for returning said tape stepping mechanism to normal to prevent movement of said tape through said recorder and means operative thereafter to stop said tape pulling mechanism with the last character recorded on said tape on said support.

17. In combination, a field of vision, a recording device for recording characters on a recording medium, a recording medium advancing means associated with said recording device for advancing said recording medium relative to said device, said advancing means in normal position preventing movement of said recording medium through said recording device, a recording medium pulling mechanism, said recording medium pulling mechanism normally pulling said recording medium across said field of vision as advanced by said recording medium advancing means and means responsive to predetermined conditions of said recording device for releasing said recording medium at said advancing means and conditioning said recording medium pulling mechanism to pull said recording medium across said field of vision until a predetermined length of said recording medium has been pulled across the field of vision.

18. In combination, a recorder for recording on a recording tape, a support, a tape stepping mechanism associated with said recorder for stepping said tape therethrough a predetermined amount concomitantly with each operation thereof, said tape stepping mechanism normally preventing movement of said tape through said recorder between operations thereof, a tape pulling mechanism normally operative to advance the tape stepped through said recorder across said support, an electrical magnetic means and

means operative at predetermined conditions of said recorder and comprising said electrical magnetic means for freeing said tape at said tape stepping mechanism and conditioning said tape pulling mechanism to pull said tape across said support until predetermined characters on said tape have been advanced to a predetermined position on said support.

19. In combination, a recorder for recording on a recording tape, a support, a tape stepping mechanism associated with said recorder for stepping said tape therethrough a predetermined amount concomitantly with each operation thereof, said tape stepping mechanism normally preventing movement of said tape through said recorder between operations thereof, a tape pulling mechanism normally operative to advance the tape stepped through said recorder across said support, a normally inoperative tape metering device associated with said tape pulling mechanism, means responsive to predetermined conditions of said recorder for freeing said tape at said tape stepping mechanism, conditioning said tape pulling mechanism to pull tape across said support and initiating the operation of said tape metering device, and means controlled by said tape metering device after a predetermined amount of blank tape has been advanced through said recorder for restoring said tape stepping mechanism to normal and stopping the operation of said tape pulling mechanism with predetermined ones of the characters on said tape in predetermined positions on said support.

20. In combination, a recorder for recording on a recording tape, a support, a tape stepping mechanism associated with said recorder for stepping said tape therethrough a predetermined amount concomitantly with each operation thereof, said tape stepping mechanism normally preventing movement of said tape through said recorder between operations thereof, a tape pulling mechanism normally operative to advance the tape stepped through said recorder across said support, a normally inoperative tape metering device associated with said tape pulling mechanism, means responsive to predetermined conditions of said recorder for freeing said tape at said tape stepping mechanism, conditioning said tape pulling mechanism to pull tape across said support and initiating the operation of said tape metering device, means controlled by said tape metering device after a predetermined amount of blank tape has been advanced through said recorder for restoring said tape stepping mechanism to normal and stopping the operation of said tape pulling mechanism when the last printed character on said tape has reached a predetermined position on said support and means for restoring said tape stepping mechanism and said tape metering device to normal concomitantly with a recording operation of said recorder during the operation of said tape metering device.

PERCY L. MYER.

EVAN R. WHEELER.