

June 4, 1940.

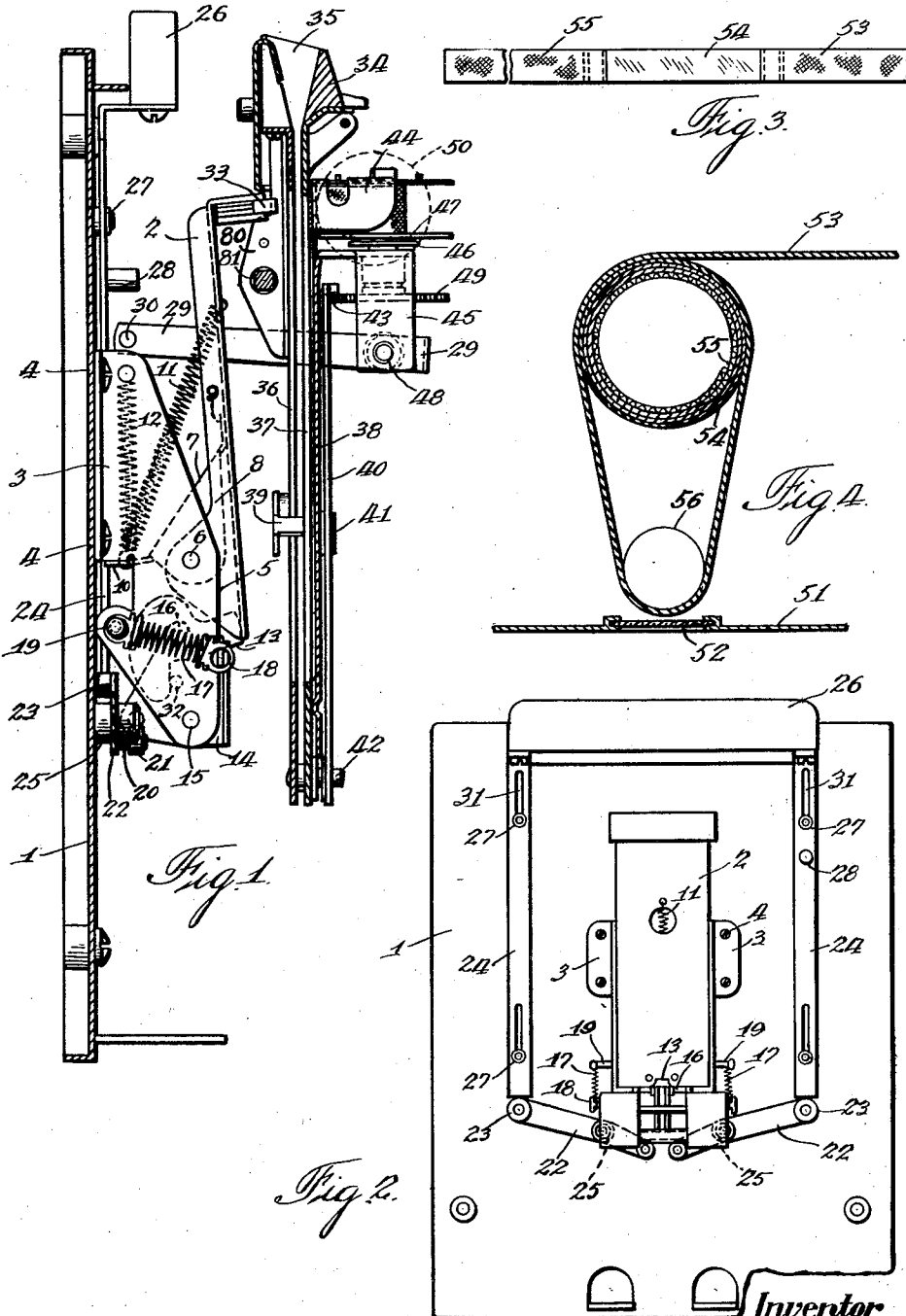
A. E. LONG

2,203,168

PRINTING MECHANISM

Filed July 9, 1936

2 Sheets-Sheet 1



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1940

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2 Sheets-Sheet 2

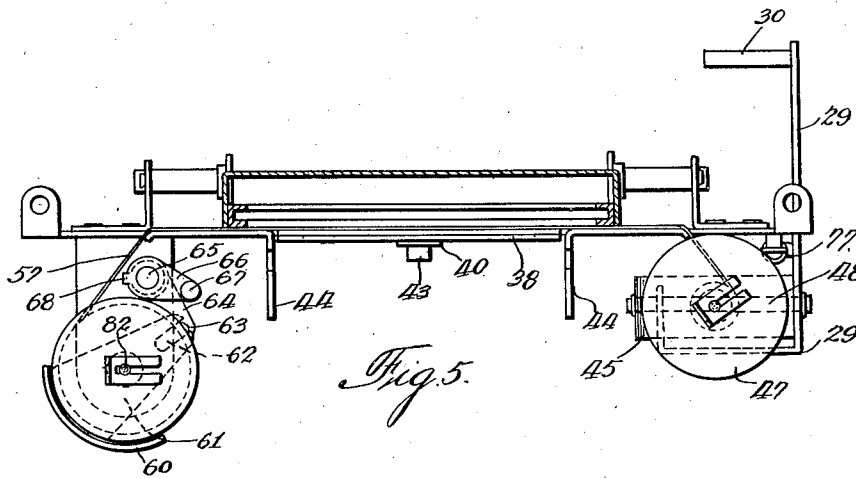


Fig. 5.

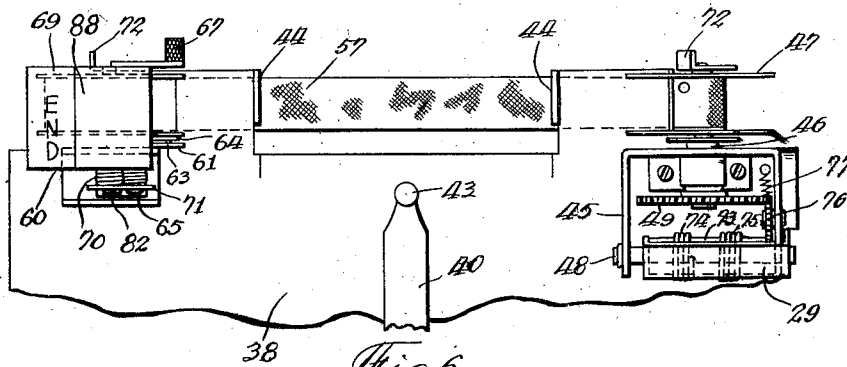


Fig. 6.

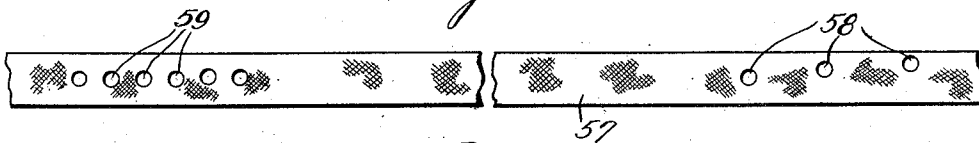


Fig. 7.

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UNITED STATES PATENT OFFICE

2,203,168

PRINTING MECHANISM

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Application July 9, 1936, Serial No. 89,795

5 Claims. (Cl. 197—173)

The present invention relates in general to printing mechanisms of the class in which printed records are made with the aid of an ink ribbon, and more particularly to the ink ribbon itself and the associated ribbon feed and control mechanism.

One object of the invention is to provide a slow ribbon feed mechanism which will allow the maximum number of impressions which can be made with the ribbon to be made during a single feeding operation from one spool to the other.

Another object is to provide a printing device with a one way ribbon feed mechanism that will deliver as many or more legible impressions as a device equipped with a ribbon reversing mechanism.

Another object is to provide an ink ribbon for a printing device which carries means to indicate when the life of the ribbon is about through.

Another object is to provide a ribbon device having an indicator to show when the ribbon needs replacement with means carried by the ribbon for operating the indicator.

Another object is to provide a one way ribbon feed wherein the life of the ribbon can be doubled by reversing the spools and presenting a new ribbon surface for additional impressions.

Another object is to provide a one way ribbon feed with a warning signal or signal operating means at each end of the ribbon to show exhaustion in case the spools are reversed for additional impressions.

Other objects and features of the invention will be apparent from the description and the claims.

The present application is a continuation in part of the co-pending Long application, Serial No. 734,767, filed July 12, 1934, which application discloses a complete time recorder incorporating one embodiment of the invention disclosed in the present application. Only that part of the recorder mechanism which is necessary for a complete and thorough understanding of the present invention has been disclosed in the drawings of the instant application.

In the drawings:

Figure 1 is a side elevational view from the left of the recorder, parts being shown in section, and discloses the back plate of the recorder, the hammer mechanism, the mechanism for operating the printing mechanism, the card receiver, and the ribbon and ribbon feed mechanism;

Figure 2 is a face view of the hammer action

and of the hammer operating mechanism mounted on the back plate of the recorder;

Figure 3 is a face view of the end portion of the ribbon used in one embodiment of the present invention;

Figure 4 is a sectional diagrammatic view of the end portion of the ribbon and the spools of the embodiment of the invention using the ribbon disclosed in Figure 3;

Figure 5 is a top view of the ribbon spools, the ribbon, the ribbon feed mechanism, and the ribbon signaling device of a second embodiment of the present invention;

Figure 6 is a front elevation of the parts disclosed in Figure 5; and

Figure 7 is a face view of the end portion of the ribbon used with the embodiment disclosed in Figures 5 and 6.

Referring in detail to Figures 1 and 2 of the drawings, the parts of the time recorder shown include a back cover plate 1, on which is mounted the hammer mechanism 2 and the printing control member 26 with its associated mechanism for operating the printing hammer 2. Removably mounted on the back cover member 1 by means of supporting brackets not shown in the drawings is an intermediate base plate 33 which supports the card receiver 34 and the ribbon spools and associated ribbon feed mechanism. The card receiver 34 is slidably mounted on this vertical base plate 38 by means of the shaft 81 which is held between two rearwardly extending brackets (not shown on the drawings), and which passes through holes in the wings 80 extending rearwardly from the card receiver 34.

The card receiver 34 is of flat construction having a funnel entrance 35 to facilitate the entry of the card and having side grooves formed between the two skeleton plates 36 and 37 to receive the side edges of the card. The movable card rest is indicated at 39 and comprises a pivoted arm having a laterally extending projection at its outer end which moves up and down in the opening formed by the skeleton framework of the card receiver under control of a time controlled cam operating on the card lift lever. Thus the card rest 39 serves to position an inserted card for the proper placing of the imprint in accordance with the day of the week, as is well known in the art.

Pivoted on the front of the vertical base plate 38 is a rock lever 40, pivoted at 41, and connected at its lower end to the card receiver by means of the connecting pin 42. This rock lever 40 is provided with a laterally extending knob

or projection 43 which engages a notch in the typewheel carriage (not shown). Thus the card receiver 34 and the typewheel carriage are positively interlocked by means of the rock lever 49 and are simultaneously moved in opposite directions by a manual adjustment in order to position the imprint in the proper column on the card.

The hammer 2 is pivotally mounted at 6 between the two vertically extending brackets 3 mounted on the rear base plate 1 by means of screws 4. The hammer withdrawal and releasing mechanism controlled by the manually operated pushbar 26 comprises the two vertically extending push rods or strips 24 connected to the pushbar 26 at their upper ends and resting upon the rollers 23 at their lower ends. These push rods 24 are movably secured to the base plate 1 by means of the pin and slot connections shown at 27 and 31. The rollers 23 are mounted on one end of the rock levers 22 which are pivoted at 25 and mount the rollers 21 at their other ends. These rollers 21 lie directly under the rod or pillar 20 extending between the two plates 14 which are pivoted to the supporting brackets 3 at 15. The two plates 14 have laterally extending portions which extend outwardly from the front edges of the plates and these laterally extending portions have two ears 18 to which are connected the ends of two springs 17. The other ends of these springs are connected to the pins 19 mounted on the supporting brackets 3. These tension springs 17 retain the two plates 14 in the position shown in Figure 1 of the drawings with the laterally extending portions of the plates 14 abutting against the front edges of the supporting brackets 3 and the rod or pillar 20 bearing on the rollers 21 thereby retaining the operating pushbar 26 and the push rods 24 in their uppermost position.

Pivotally mounted on the two plates 14 on a rod or shaft 16 extending between these two plates is an operating dog 13 having an arcuate portion engageable with and slidable along a wear plate 45 at the lower end of the hammer 2. This operating dog 13 has a downwardly extending tail which engages a stop pin 32 extending between the two plates 14. When the pushbar 26 is depressed by the hand of the operator, the movement thereof is transmitted to the pushbars 24 and the rock levers 22 and results in a clockwise rotation of the two plates 14 about their pivot 15. The operating dog 13 is mounted between these two plates near their upper ends at 16 and therefore, the rod 16 is moved to the right causing the dog to push the lower end of the printing hammer 2 to the right and resulting in a counter-clockwise rotation of the hammer about its pivot point 6. As the operating dog moves to the right the stop pin 32 prevents its rotation about the rod or shaft 16 and therefore the arcuate portion which is in engagement with the wear plate on the hammer is gradually lowered until it becomes disengaged from the hammer and allows the latter to be operated in its printing blow by means of its operating springs as will be described later.

In order to enable the final printing action of the hammer to take place under its own momentum and also to cause a partial withdrawal of the hammer after printing to bring it in position for re-engagement with the hammer actuating mechanism, a spring lost motion connection is provided between the hammer actuating spring 12 and the hammer 2. This lost motion spring connection comprises a rock member 7 having

downwardly turned ears 8. This rock member 7 is pivotally mounted between the supporting brackets 3 coaxially with the hammer 2 on the shaft 6 which passes through the downwardly extending ears 8 of the rock member 7 and also through the rearwardly extending ears 5 of the hammer 2. An abutment portion 9 of the rock member 7 is normally held in engagement with the main body of the hammer 2 by means of the spring 11 which is connected at its upper end to the hammer 2 and at its lower end to a rearwardly extending flat plate portion of the rock member 7. This rearwardly extending portion of rock member 7 has two laterally extending ears 10 which are normally held against the lower edges of those portions of the brackets 3 which form the top of the cut-out portions of these brackets. The ears 10 held against the edge portions of the brackets 3 by means of the hammer operating spring 12 which is connected at its lower end to the rearwardly extending tail or projection of the rock member 7 and is connected to the supporting brackets 3 at its upper end.

When the pushbar 26 is depressed by the operator as previously described and the lower end of hammer 2 is moved to the right as seen in Figure 1, the hammer 2 and the rock member 7 are both rotated in a counter-clockwise direction about the pivot point 6. This withdrawal movement of the hammer tensions the hammer operating spring 12. When the operating dog 13 slips off the lower end of hammer 2, the hammer is snapped forward by means of spring 12 until the laterally extending ears 10 of rock member 7 engage the stop edges of the supporting brackets. The rock member 7 is therefore stopped in this position but the momentum of the hammer 2 carries it forward to deliver its printing blow, stretching the spring 11 which connects the rock member 7 and the hammer 2. After it has delivered its printing blow the hammer 2 is returned to the position of Figure 1 of the drawings by spring 11 with the abutment portion 9 of the rock member 7 abutting against the back of the hammer.

Extending between the two ribbon spools 47 at the front of the vertical base plate 38 is the ink ribbon which is fed across the face of the typewheels, indicated at 50, so that the printing hammer 2 in delivering its printing blow will strike a card inserted in the card receiver 34 and impress this card against the typewheels with the ink ribbon interposed between the card and the type. The present invention concerns itself particularly with this ink ribbon per se and with the associated ribbon feed mechanism. Two embodiments of the invention are disclosed, one in Figures 3 and 4 of the drawings, and the other in Figures 5, 6, and 7 of the drawings. The ribbon feed mechanism is the same for both embodiments of the invention and this ribbon feed mechanism will now be described with reference to Figures 1, 5, and 6 of the drawings.

The right hand ribbon spool 47 upon which the ink ribbon is to be wound is mounted on a bracket 45 extending outwardly from the front of the vertical base plate 38 and having two downwardly extending arms. The ribbon spool 47 is mounted on a vertically extending shaft 46 and is held in position on this shaft by means of the retaining clip 72 which engages a groove in the upper end of the shaft. Mounted on the lower end of shaft 46 is a gear 49 which engages an idler pinion 76 mounted in one of the downwardly extended arms of the bracket 45, the idler pinion 76 in turn engaging a pinion ro-

tatable with the drum 73. The drive for the take-up spool 47 is from the operating pushbar 26. When the workman depresses the pushbar 26 to effect a printing operation, the operating pin 28 mounted on the right hand push rod or strip 24 engages a laterally extending pin 30 mounted on the rock lever 29. The rock lever 29 is pivoted on the shaft 48 and is in the form of an L having a laterally extending portion extending across the face of the drum 73 and a rearwardly extending portion which is also pivoted on shaft 48.

Surrounding the drum 73 is an actuating coil spring 74 and a retaining coil spring 75. One end of the actuating coil spring 74 is secured to the laterally extending portion of the rock lever 29 so that when this lever is rocked by depression of the operating pushbar 26 the coil spring 74 will grip the drum and rotate the same slightly. One end of the retaining spring 75 is connected to the bracket 45 and when the operating pushbar 26 is released and returns to its normal position, the coil tension spring 77 extending between rock lever 29 and the pin secured to the base plate 38 rocks the lever 29 to its normal position and during this return movement the coil retaining spring 75 grips the drum so that the same will not be rotated. The rotation of the drum 73 is transmitted to the take-up spool 47 through the pinion which rotates with the drum, the idler pinion 76, the gear 49, and the shaft 46 upon which the take-up spool 47 is mounted.

From the foregoing description of the ribbon feed mechanism, it will be seen that each time the recorder is operated to make a printing impression, the ribbon is moved a very slight amount by means of the spring and drum drive. The reverse mechanism usually used on ordinary ribbon feeds has been done away with entirely and a new and novel ribbon feed is employed whereby the ribbon is fed very slowly across the face of the type until the ribbon is used up, when a new ribbon is inserted. To accomplish this a slow spring drive is used doing away with the ratchet wheel and pawl construction and the gear reduction that would be necessary if a ratchet and pawl were employed. The slow drive is accomplished in such a manner that the life of the ribbon is at least as long as that of a ribbon used with a reversing mechanism, it being possible to get as great a number of legible impressions in this manner.

The feed of the ribbon across the face of the type with the spring grip drive accomplishes a two-fold purpose. When a fresh ribbon is inserted, the feed is extremely slow and takes from 500 to 600 impressions to move an inch of ribbon as it is at this time winding up on the smallest diameter of the take-up spool. As the ribbon winds up on the winding spool, the circumference of the wound ribbon increases and as it always takes from 500 to 600 impressions to give the spool one revolution, the ribbon feed across the face of the type gradually increases until it reaches its maximum feed as the ribbon is nearing the end of its travel. Thus fresh ribbon is fed faster toward the end of travel when the ribbon may naturally be dryer than when first installed. However, this is precautionary only as the feed described above tends to keep the ribbon moist throughout its travel, as only a small portion is exposed to the air before it has given up its maximum impressions and passed on to the winding spool. This is the sec-

ond advantage spoken of above as in a reverse feed mechanism the ribbon is constantly wound and unwound and drawn across the face of the type and guide plates repeatedly, exposing it to the air time after time which tends to dry up the ribbon quickly.

The ribbon spools may be so positioned with respect to the hammer and typewheels, as shown in Figure 1 of the drawings, that the hammer operates on substantially the upper half of the ribbon only. This is done so that when the ribbon has been entirely wound up on the take-up spool 47 and the upper half of the ribbon has been completely exhausted, the ribbon spools may be reversed, thereby presenting the unused half of the ribbon for additional impressions. Thus the life of the ribbon may be doubled by simply reversing the ribbon spools after one feeding operation from one spool to the other has been completed.

As there is no reversing mechanism for the ribbon, it is desirable that some means be provided for showing when the end of the ribbon is about to be reached. Two means of accomplishing this result have been disclosed in the drawings. Referring first to Figures 3 and 4 of the drawings, the ribbon used with this embodiment of the invention comprises a main ink portion 53 and a signal portion 55 of a distinctive color to serve as a signal when the end of the ribbon is about to be reached, with a strip of non-absorbent material 54 interposed between portions 53 and 55 to prevent the ink from the ink ribbon 53 from being absorbed by and discoloring the signal portion 55. This intermediate non-absorbent material 54 is of sufficient length that it will completely surround the signal portion 55 and overlap upon itself when wound upon the spool so there is no possibility of the ink portion 53 coming in contact with the signal portion 55.

In this modification of the invention, the bracket which extends from the vertical base plate 38 and upon which the left hand ribbon spool is mounted is further extended, and an idler spool 56 is also mounted thereon. This idler spool 56 lies directly behind an opening or window in the cover 51 which completely encloses the recorder and this opening or window is provided with a glass 52. As clearly shown in Figure 4, the ribbon is threaded from the left hand spool around the idler spool 56 and then around the wound ribbon spool to the right where it passes across the face of the typewheels and over to the take-up spool at the right side of the vertical base plate 38. Then when the ribbon nears the end of its travel, the ink portion 53 which has been visible through the window in the cover will be replaced by the strip of non-absorbent material 54 and finally by the signaling portion 55 which is of the distinctive color so as to indicate that the length of the ribbon is nearly exhausted. Due to the slow feed mechanism, it will perhaps be a matter of several days after the signal portion becomes visible through the sight opening that the ink portion of the ribbon has completely passed the typewheels. This allows a sufficient time so that the ribbon can be reversed or changed at the convenience of the man in charge. However, if the signal is disregarded and the ribbon is not changed or reversed, the portion 54 thereof will finally be interposed between the card and typewheels and the result is that the recorder will not make a printing impression. This will necessitate a

change or reversal of the ribbon before further printed records can be obtained from the recorder.

A second embodiment of the invention is disclosed in Figures 5, 6, and 7 of the drawings. In this modification, the idler spool 56 has been eliminated and a different type of ribbon and signaling mechanism is disclosed. The ribbon feed mechanism in this modification is the same as has previously been described. The left hand spool or the spool from which the ribbon is unwound is mounted on forwardly extending brackets secured to the vertical base plate 38. The brackets rotatably support the shaft 82 which mounts the ribbon spool and the spool is retained in position by means of the retaining clip 72. The drag on the shaft 82 to prevent too rapid unwinding of the ribbon is provided by means of the spring 70 which is compressed between a washer on shaft 82 held in position by means of a cotter key and the upper arm of the supporting bracket. Also mounted on the supporting bracket is a rotatable shaft 65 which has secured thereto an indicator operating arm 64 and an indicator resetting arm 66 having a knurled knob 67 which is grasped by the operator to reset the indicator. The arms 64 and 66 are rigidly secured to the shaft 65 and rotatable therewith. Mounted at the outer end of the arm 64 is a pin 63 which engages a slot in the end of the indicator mounting plate 61. This mounting plate is pivoted about the shaft 82 and at its other end mounts the curved or arcuate signal plate 60. This signal plate is located directly behind a window in the cover such as shown in Figure 4 of the drawings, and completely covers the space behind such opening. The signal plate is divided into two portions; the right hand portion 88 being of a distinctive color, such as blue, to indicate that there is sufficient length of ribbon still available for printing operations and that the ribbon does not need replacing; the left hand portion of the signal plate is of another color, such as white, and has the letters END printed thereon to indicate that the end of the ribbon has been reached when this portion of the signal plate is operated to a position directly behind the window in the recorder cover.

The shaft 65, or a collar securely fastened thereto, has a protruding pin or projection 68 which is normally spaced from the ribbon 57 at the beginning of the ribbon travel, i. e. when nearly all of the ribbon is still wound on the left hand spool, and which is engaged by the ribbon as the ribbon is unwound from the spool and the diameter of the ribbon roll decreases.

The ribbon designed for this signaling arrangement is shown in Figure 7 of the drawings. As the ribbon is fed across the face of the typewheels, and nears the end of its travel, that portion of the ribbon containing the three spaced and somewhat offset holes 58 is unwound from the spool and one of these holes will engage the protruding pin 63. As the ribbon feed mechanism continues to draw the ribbon to the right, the shaft 65 will be gradually rotated in a clockwise direction, the pin 63 mounted on the arm 64 moving to the left and rotating the indicator mounting plate 61 in a counter-clockwise direction about its pivot point 82. Thus the signal plate 60 will gradually move to the right causing the blue colored portion 88 to gradually be replaced by the white colored portion 69 to indicate that the ribbon is nearing the end of its

travel. Suitable stops are provided to limit the rotation of the signal plate and mounting plate so that the pin 63 cannot become disengaged from the slot in the mounting plate 61.

The holes 58 in the ribbon have been slightly offset so that if one of the holes should fail to engage the pin 68, one of succeeding holes will be in proper alignment to engage the pin and operate the indicating mechanism. A short length of ink ribbon is still available for printing operations after the holes 58 have passed the typewheels. If the ribbon is not changed during this time, eventually a series of holes 59 which are located relatively close together will be moved into cooperative relation to the typewheels and printing hammer so that only a portion of the time imprint will be printed on the card. Thus if the operator in charge of the recorder completely ignores the indicator which signals that the length of the ribbon is about through and continues to allow the recorder to be operated without changing the ribbon, the holes 59 will eventually cause only a portion of the imprint to be made on the record card and will absolutely necessitate a change in ribbon in order to secure legible impressions. As has been previously explained, the ribbon spools may be inverted and a second feeding operation from one spool to the other may be had using a different portion of the width of the ribbon, thereby doubling the number of impressions which may be obtained.

When the indicator has been operated to its indicating position to signal that the ribbon is nearing the end of its travel, the man in charge of the recorder will either invert the spools to present the new ribbon surface to the typewheels and hammer, or will insert a new ribbon in case the ribbon spools have been previously inverted. The indicator must then be manually set to its normal position by grasping the knurled knob 67 and rotating the resetting arm 66 in a counter-clockwise direction to the position shown in Figures 5 and 6 of the drawings.

From the foregoing description, it will be seen that a new ribbon feed and ribbon signaling mechanism has been devised whereby the ribbon is fed across the face of the type at such a slow rate that the maximum number of impressions which can be made with the ribbon will be made during a single feeding operation from one spool to the other. When the ribbon has reached the end of its travel, the spools must be inverted for a second feeding operation or a new ribbon must be installed. This insures that clear legible impressions will always be obtained from the recorder since the ribbon is not continuously being pounded in its travel back and forth across the face of the typewheels long after its useful life has been exhausted and it will no longer make clear legible impressions, as is too often the case when automatic reversing mechanism is provided on the recorder. Furthermore, as has been previously pointed out, the slow feed mechanism does not continually expose the ribbon to the air during its travel back and forth across the face of the type, as is the case when reversing mechanisms are used, and therefore the ribbon does not dry out as quickly. The ribbon is provided with signaling mechanism to indicate when the life of the ribbon is nearly exhausted and when this signaling mechanism is operated, the man in charge of the recorder knows that the ribbon must either be changed and a new ribbon installed or the ribbon spools must be inverted in order to present a fresh surface for further im-

pressions. The type ribbon itself carries the signaling means, either a direct signal which can be viewed through a window or opening in the casing of the recorder, or a means for operating a separate indicating mechanism as is disclosed in the second embodiment of the invention.

Other advantages will be apparent to those skilled in the art and it will also be apparent that numerous modifications may be made in the invention without departing from the spirit or scope of the appended claims.

What is claimed is:

1. The combination in a printing device of a casing having a sight opening therein, printing mechanism, an ink ribbon cooperating therewith, ribbon feed mechanism for feeding said ribbon past said printing mechanism comprising a ribbon spool, a visual indicator mounted for arcuate movement between said spool and said sight opening about an axis extending longitudinally of the axis of said spool, and means controlled by said ribbon near the end of its feeding movement for moving said indicator into observable position behind the sight opening in said casing.
2. The combination with an ink ribbon of a ribbon control and indicating device comprising a spool upon which the ribbon is wound, means spaced from the ribbon roll for guiding the ribbon as it unwinds from the spool, and indicator control means comprising an actuating member adjacent that portion of the ribbon between the spool and guide means, said ribbon being normally out of engagement with said actuating member and provided with an opening, the edge of which engages said actuating member as the ribbon roll decreases in diameter for causing the operation of the indicating means.
3. The combination with an ink ribbon of a ribbon control and indicating device comprising a spool upon which the ribbon is wound, means spaced from the ribbon roll for guiding the ribbon as it unwinds from the spool, and indicator

control means comprising an actuating member adjacent that portion of the ribbon between the spool and guide means, said ribbon being provided with means engageable with said actuating member as the ribbon roll decreases in diameter for causing the operation of the indicating means, said indicating means comprising an oscillatable signal member coaxial with said spool.

4. The combination with an ink ribbon of a ribbon control and indicating device comprising a spool upon which the ribbon is wound, means spaced from the ribbon roll for guiding the ribbon as it unwinds from the spool, and indicator control means comprising an actuating member adjacent that portion of the ribbon between the spool and guide means, said ribbon being normally out of engagement with said actuating member and provided with a plurality of longitudinally spaced openings differently spaced laterally on the ribbon, the edges of which may engage said actuating member as the ribbon roll decreases in diameter for causing the operation of the indicating means.

5. The combination with an ink ribbon of a ribbon control and indicating device comprising a spool upon which the ribbon is wound, means spaced from the ribbon roll for guiding the ribbon as it unwinds from the spool, and indicator control means comprising a pivotally mounted actuating member adjacent that portion of the ribbon between the spool and guide means, said ribbon being normally out of engagement with said actuating member and provided with an opening, the edge of which engages said actuating member as the ribbon roll decreases in diameter for causing the operation of the indicating means, said indicating means comprising an oscillatable signal member coaxial with said spool.

FLORENCE B. LONG,

Administratrix of the Estate of Albert E. Long,
Deceased.