Feb. 14, 1956 R. E. PHINNEY 2,734,455

TWO-COLOR RIBBON CONTROL FOR LISTING CALCULATORS

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FIG. 1

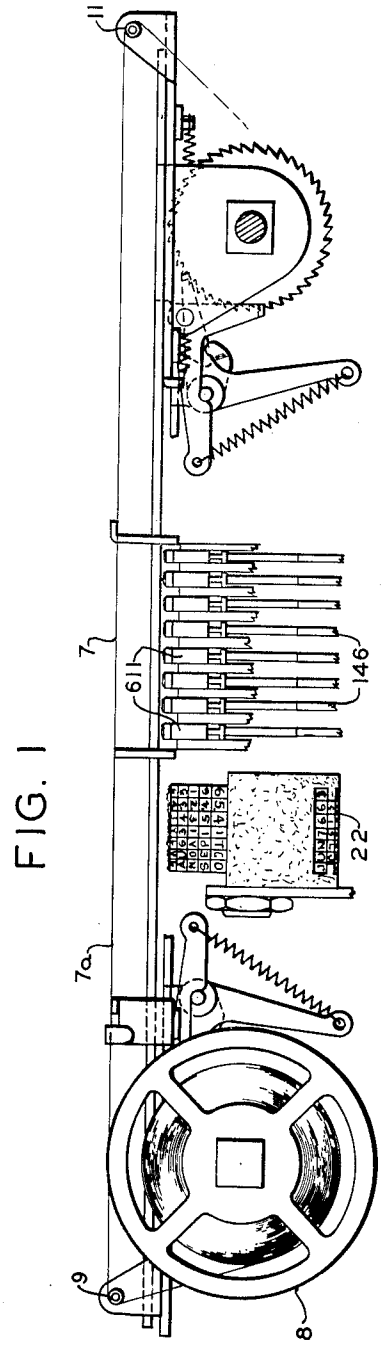
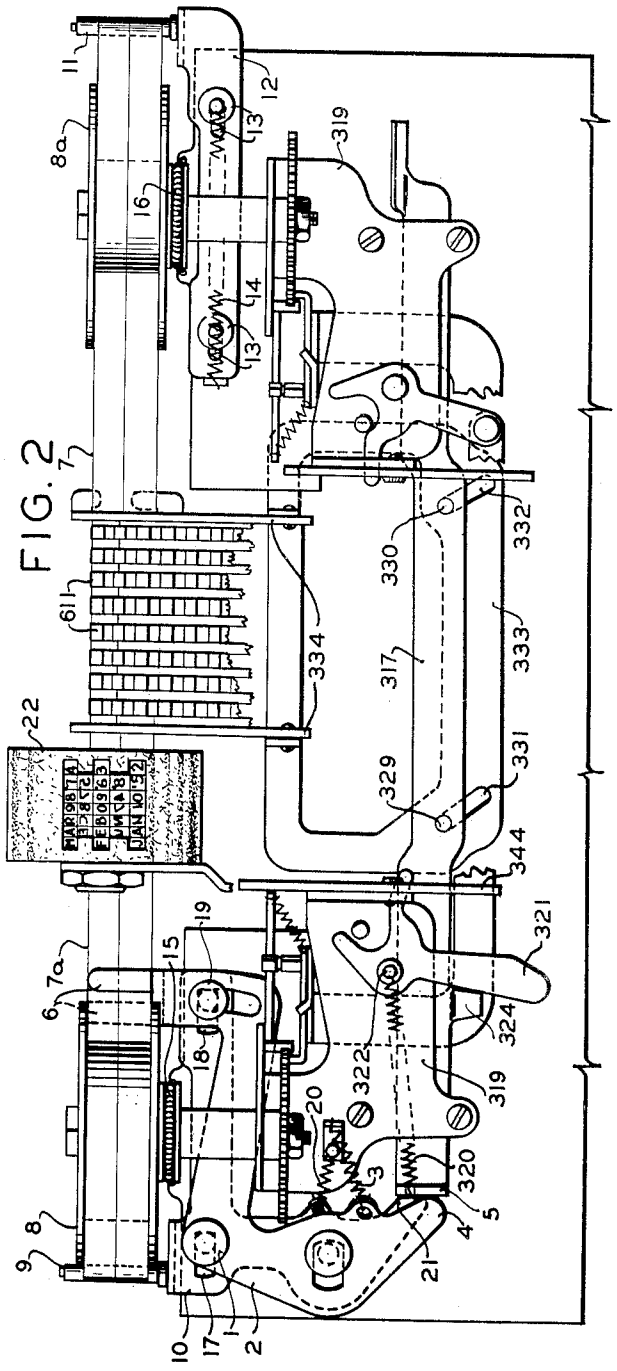


FIG. 2



INVENTOR
ROBERT E. PHINNEY
BY Elmer W. Edwards
AGENT

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FIG. 3

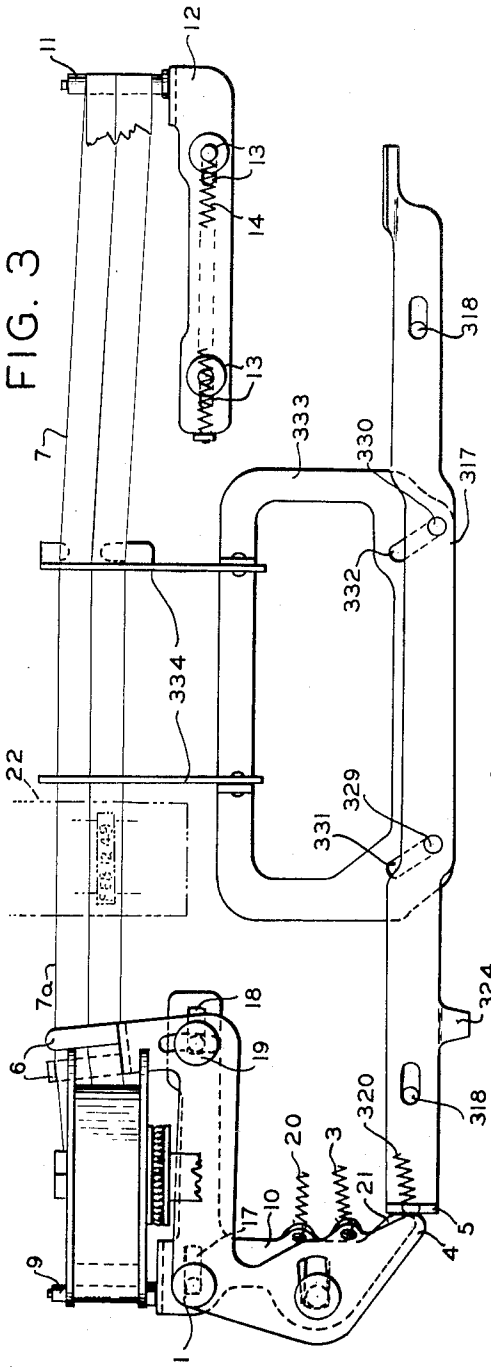
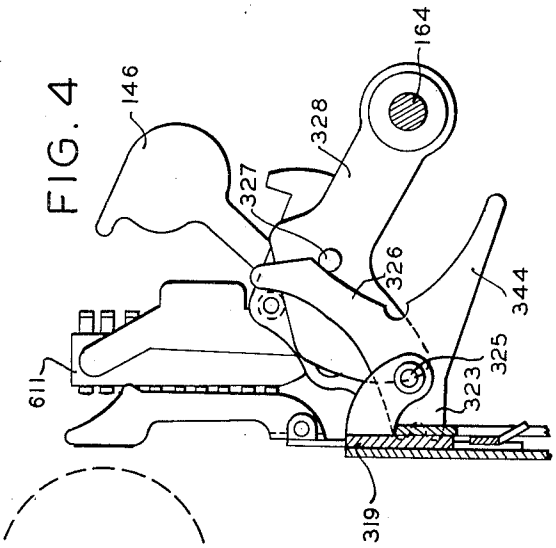


FIG. 4



INVENTOR
ROBERT E. PHINNEY
BY Elmer W. Edwards
AGENT

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TWO-COLOR RIBBON CONTROL FOR LISTING CALCULATORS

Robert E. Phinney, Livingston, N. J., assignor to Monroe Calculating Machine Company, Orange, N. J., a corporation of Delaware

Application November 1, 1952, Serial No. 318,162

5 Claims. (Cl. 101—336)

The invention relates to improved ribbon control devices for listing calculators or the like whereby arithmetical records may be distinguished in accordance with the sign character of a registration through adjustment of the printing type ribbon to positions for effecting printing in different colored ink.

Ribbon feed mechanism for advancing the ribbon from one spool to another spool and employing suitable spring tensioned devices for taking up ribbon slack are well known in the art, as is also means for raising and lowering a type ribbon to bring different colored portions of the ribbon opposite the printing type. Such a mechanism is disclosed in U. S. Patent 1, 945,027, issued January 30, 1943, to Loring P. Crosman and entitled "Listing Calculator."

It is well known practice in the art to provide ribbon guides placed each side and as close as possible to the printing type and to use the guides for raising the ribbon in a parallel manner along the type members.

In raising the type ribbon to effect printing in a different color, the displacement of the ribbon from its usual straight line position between the ribbon spools causes an increased tension to be exerted on the ribbon which in turn and in like manner increases pressure of the ribbon upon the lifting guides. Because of this pressure, particularly if occurring at a time when the ribbon is being advanced from one spool to the other and more particularly at such times as when the ribbon having been completely drawn from one spool is also called upon to operate the usual well known ribbon reverse mechanism, the guides frequently will cause the ribbon to fold or crease and so fail to fully displace the type ribbon and thereby cause printing to be effected in double colors. Furthermore, in using supplemental printing devices, such as well known date printers which are customarily placed to one side of the regular printing devices and use the same type ribbon, it has been found that such supplemental printing devices often will erroneously print in double colors, due to the angular displacement of the type ribbon as the ribbon is raised by the guides for a color change.

Applicant provides novel means for overcoming these objections by the use of auxiliary ribbon displacing means adapted in cooperation with a raising of the ribbon by the above guides to raise the type ribbon at a point near the ribbon spool so that the raised ribbon will now extend horizontally across the supplemental printing means as well as the regular printing means. Such added displacement of the ribbon, however, by increasing the angular movement thereof around its support, requires further yielding of the tension devices or a stretching of the ribbon and this would normally act to increase tension exerted upon the ribbon. Means are provided, however, for combining an operation of the auxiliary ribbon displacing means with devices which act automatically to compensate for the needed increase in the length of ribbon, in such manner that no load will be placed on the ribbon due to its being raised, so that a uniform tension is now maintained upon the ribbon throughout a displacement thereof.

In the drawings:

Fig. 1 is a plan view of the ribbon control devices.

Fig. 2 is a front elevation showing the parts in normal condition, the type ribbon being in lowered position.

Fig. 3 is a front elevation showing the parts in operative condition, the type ribbon being in raised position.

Fig. 4 is a detail plan view of means for operating the ribbon control devices.

The invention is applied to listing calculators of well known type. It will be sufficient to say that in such machines amounts set up on the keyboard are accumulated in one or more registers, either additively, by engagement of a register during the upward stroke, or subtractively, by engagement thereof during the downward stroke of reciprocatory actuating segments. The extent of movement of each segment is determined by the value of the corresponding set digit key. Type bars, connected with the segments, are designed to bring type of corresponding values to the printing line. The record sheet and platen are supported in a transversely shiftable carriage, so that the accumulated values may be printed in any one of several columns. The accumulating and printing, including operation of the supplemental date printing device is performed by power means under control of suitable motor keys in well known manner, and as described in more detail in the reference Patent 1,934,027. As in said patent, a slide **317** is secured by pin and slot engagement **318** to the rear frame of the machine, and is tensioned toward the right by means of a spring **320**.

A bell crank lever **321**, fulcrumed at **322** upon bracket **319**, has one arm adapted to engage a projection **324** of slide **317** and its other arm in engagement with the bifurcated end **323** of a lever **344** (Fig. 4) fulcrumed at **325** upon bracket **319**. An arm **326** of lever **344** has engagement with a pin **327** fast in an arm **328** fast to a shaft **164**, and as said shaft is caused to be rocked in well known manner during an operative cycle of the machine, pin **327** will fall away from arm **326** of lever **344** and slide **317** will be free to move toward the right, under influence of the spring **320**.

Fast in slide **317** are pins **329** and **330**, having engagement with the walls of angularly disposed slots **331** and **332** of a frame **333**, provided with ribbon guide members **334** spaced one to each side of the usual printing type members **611** and their related hammers **146**. As slide **317** is moved toward the right, pins **329** and **330** will cam frame **333** upwardly to raise the type ribbon and bring the lower red ink portion thereof to the printing line relative to the hammers **146** of the regular printing devices.

Auxiliary ribbon control

In machines of the types to which the present invention is applied, it is desirable that provision of supplemental printing devices, such as date-printers or the the like, be made optional to the demands of the purchasers and when so required are customarily placed contiguous to the regular printing devices of the machine. In operations involving a change in printing color therefor, it then becomes advantageous that a wider area of the printing ribbon be displaced when including such supplemental printing devices in the said color change. For displacing said wider area of the ribbon suitable auxiliary ribbon control means are provided adapted for operation in cooperation with the regular ribbon displacing means as will now be described.

Fulcrumed upon a stud **1**, fast to the rear frame of the machine, is a bell crank lever **2** held in a clockwise direction against tension of its spring **3** by engagement

of the lower arm 4 of said lever with a projection 5 of the slide 317, as shown in Fig. 2. The other arm of bell crank 2 is bifurcated to form a pair of tongues 6, one of which is offset slightly so that the type ribbon 7 may pass freely between said tongues. From the usual ribbon spool 8 the type ribbon is first passed around a roller 9, supported upon a slide 10 to be described, then is passed between tongues 6 of lever 2 and through guides 334; thereafter the ribbon is passed around a suitable slack-take-up roller 11 to storage spool 8a. Roller 11 is carried upon a slide 12 supported by pin and slot connections 13 to the rear framing of the machine, said slide also being tensioned toward the right by a light spring 14. Suitable friction drag springs 15—15 extending around the hubs of spools 8—8a, however, will hold ribbon 7 sufficiently taut so that slide 12 normally will be held toward the left and against pin and slot connections 13.

Slide 10 is supported to the rear frame of the machine by means of slotted openings 17—18 embracing studs 1 and 19 and is held toward the left against tension of its spring 20 by engagement of a lower arm 21 of said slide with the projection 5 of the slide 317.

During the rightward movement of slide 317 in lifting guides 334, previously described, the projection 5 will move away from the end 4 of bell crank 2 so that simultaneously with the raising of the type ribbon 7 by guides 334, bell crank 2 will now raise the left end 7a of the ribbon 7 sufficiently so that the ribbon will extend in a parallel manner across the supplemental date printer means 22 as seen in Fig. 3. In the above described raising of the ribbon end 7a it is apparent that a consequent increase in the angular displacement of the ribbon about its support roller 9 tends to draw the ribbon from spool 8 and thereby causes an increase of tension upon the ribbon. Novel means are provided, however, to neutralize any tensions added to the type ribbon throughout the movement thereof in effecting a color change. During the above operation, projection 5 moves away from the end 21 of slide 10 so that as bell crank 2 lifts the end 7a of the type ribbon, the slide 10 will also simultaneously move toward the right under influence of spring 20 and will carry therewith the roller 9 and thereby prevent any added tension from being built up in the type ribbon due to the above described displacement of the ribbon. The timing of the above action is such that any initial tension in the type ribbon will remain uniform throughout the operation; that is, the displacement of roller 9 toward the right acts to uniformly compensate for the added length of ribbon that is required as the ribbon is angularly displaced relative to roller 9 by the lifting action of bell crank 10.

Following a printing operation of hammers 611 and dater 22, in well known manner, arm 328 will be restored and pin 327 engaging arm 326 rocks lever 344 counterclockwise. Counterclockwise movement of lever 344 restores slide 317 toward the left whereupon pins 329—330 will move guides 334 downwardly while projection 5 of said slide will engage arm 4 to rock lever 2 and thereby lower the end 7a of ribbon 7 related to the dater 22. During this operation, projection 5 will also engage arm 21 of slide 10 and move the slide toward the left so that roller 9 will act to concurrently take up the slack in the ribbon as it is being lowered to its normal straight line position and thereby maintain uniform tension on the ribbon during the operation.

Having now described ribbon control devices adapted for raising a type ribbon to bring a different colored portion of the ribbon to printing position in such manner that no added tension is caused to be applied to the ribbon, what I claim is:

1. In a calculating listing machine or the like having printing devices including type members and related printing hammers, supplemental printing devices contiguous to said first named type members to form a wider printing area for optional simultaneous imprinting action from both of said group of type or from one said group of type members solely, a bi-color printing ribbon extending across both of said printing devices, means for tensioning said ribbon including an adjustable mounting for permitting displacement thereof, ribbon adjusting means for displacing one section of said ribbon to bring a different color to printing position relative to the first said printing devices, auxiliary ribbon adjusting means including a bell crank member operable by said ribbon adjusting means and co-operable therewith to simultaneously displace a second section of the ribbon to bring the correspondingly colored portion of said second section to printing line position relative to said supplemental printing devices and wherein the auxiliary ribbon adjusting means concurrently displaces said tensioning means so that no added tension is imparted to the ribbon due to said displacement of the ribbon by said auxiliary adjusting means.

2. In a calculating listing machine or the like having printing devices including type members and related printing hammers, supplemental printing devices adjacent said first named printing devices, a printing ribbon extending across both said printing devices, means for tensioning said ribbon, ribbon adjusting means for displacing one section of said ribbon to bring a different color to printing position relative to the printing devices, auxiliary ribbon adjusting means operable by said ribbon adjusting means and cooperable therewith to displace a second section of the ribbon to bring the correspondingly colored portion of said second section of the ribbon to printing line position relative to said supplemental printing devices and wherein the auxiliary ribbon adjusting means concurrently displaces said tensioning means so that no added tension is imparted to the ribbon due to said displacement of the ribbon, a ribbon storage spool and wherein the auxiliary ribbon adjusting means includes a pivoted member, one arm of which has a bifurcated end embracing the type ribbon and adapted to raise said ribbon, a slidable member provided with a roller spaced from said spool and adapted for holding the type ribbon under tension and wherein both of said members operate concurrently to simultaneously raise the type ribbon and to release tension thereon so that no tension is transmitted to the type ribbon in the operation of said auxiliary ribbon adjusting means.

3. In a calculating listing machine or the like, the combination comprising printing devices including type bars and associated printing hammers, ribbon storage spools, a printing ribbon extending between said spools and having opposite end portions thereof wound thereon, ribbon adjusting means adapted for perpendicularly displacing independently of a movement of the spools a section of said ribbon extending between said spools, a slidable member adapted to control operation of said ribbon adjusting means, and ribbon tensioning means including a slidable support for permitting displacement thereof, adapted for a lateral movement under control of the said slidable member in synchronized unison with said perpendicular adjusting means to laterally displace a portion of said ribbon whereby a substantially uniform tension is maintained upon said ribbon throughout displacement thereof.

4. In a calculating listing machine or the like, the combination comprising printing devices including type members, supplemental printing devices contiguous to said first named type members to form a wider printing area for optional simultaneous imprinting action from both of said group of type or from the first mentioned type members solely, a type printing ribbon and storage spools upon which opposite end portions of said ribbon are secured, vertical adjusting means for raising independently of the spools a section of said ribbon spaced between said storage spools and related to said first named

printing devices; auxiliary vertical adjusting means including a pivoted member operable concurrently with the first said adjusting means for raising an additional length of said ribbon section spaced between said spools and related to said supplemental printing devices, and ribbon tensioning means having an adjustable support for permitting a displacement thereof and adapted for movement synchronized in unison with an operation of said pivoted member during an operation of the auxiliary adjusting means to laterally displace a portion of said ribbon and thereby maintain a substantially uniform tension upon said ribbon throughout said adjustment thereof by said auxiliary adjusting means.

5. In a calculating listing machine or the like, the combination comprising printing devices including printing hammers and associated type members, a bi-color printing ribbon positioned relative to said hammers for effecting printing in a given color, spaced storage spools for supporting opposite end portions of said ribbon wound thereon, adjusting means for said ribbon including an operating control slide adapted to raise a portion of said ribbon independently of said storage spools to bring a different colored part thereof to effective printing position relative to said hammers, supplemental printing devices contiguous to said first named type members to form a wider printing area for

optional simultaneous imprinting action from both of said group of type or from the first mentioned type members solely, auxiliary ribbon adjusting means including a pivoted member operable with said slide and cooperable with said first adjusting means to raise therewith a second portion of said ribbon for bringing a corresponding colored part of said second portion of the ribbon to effective printing position relative to the said supplemental printing devices, and devices for imparting tension to said ribbon including a slidable support for permitting displacement thereof operable by said control guide in unison with said ribbon adjustment to laterally displace a portion of said ribbon in synchronized unison with the raising thereof and thereby maintain a uniform tension upon said ribbon.

References Cited in the file of this patent

UNITED STATES PATENTS

924,066	Herzog	June 8, 1909
1,080,907	Gatewood	Dec. 9, 1913
1,945,027	Crosman	Jan. 30, 1934
2,135,156	Watkins	Nov. 1, 1938
2,198,139	Svensson	Apr. 23, 1940
2,602,530	Runde	July 8, 1952