

June 1, 1965

R. L. SCHULTZ

3,186,533

CARRIAGE AND RIBBON MECHANISM FOR CALCULATING MACHINES

Original Filed Nov. 1, 1960

4 Sheets-Sheet 1

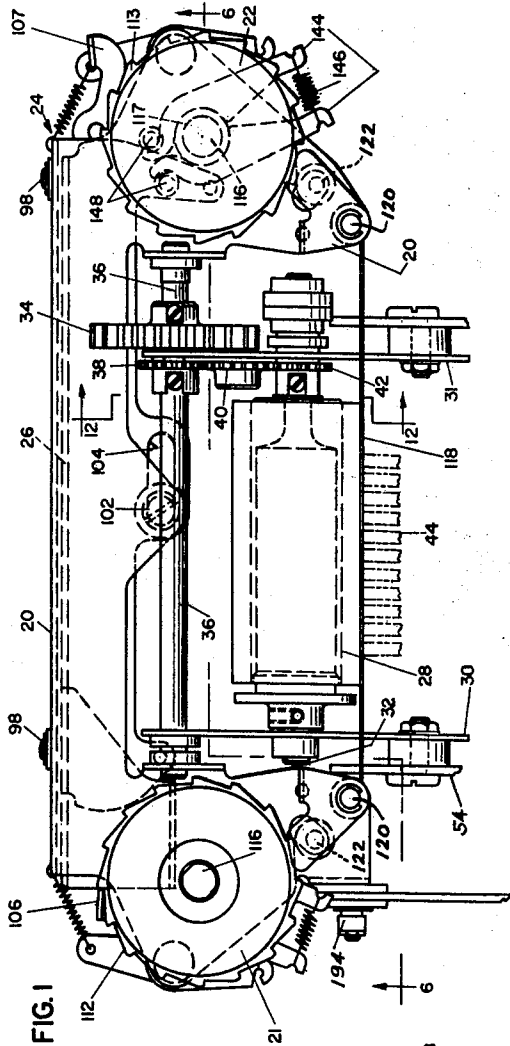


FIG. 1

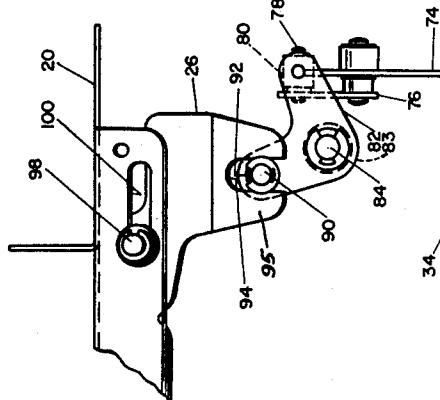


FIG. 10

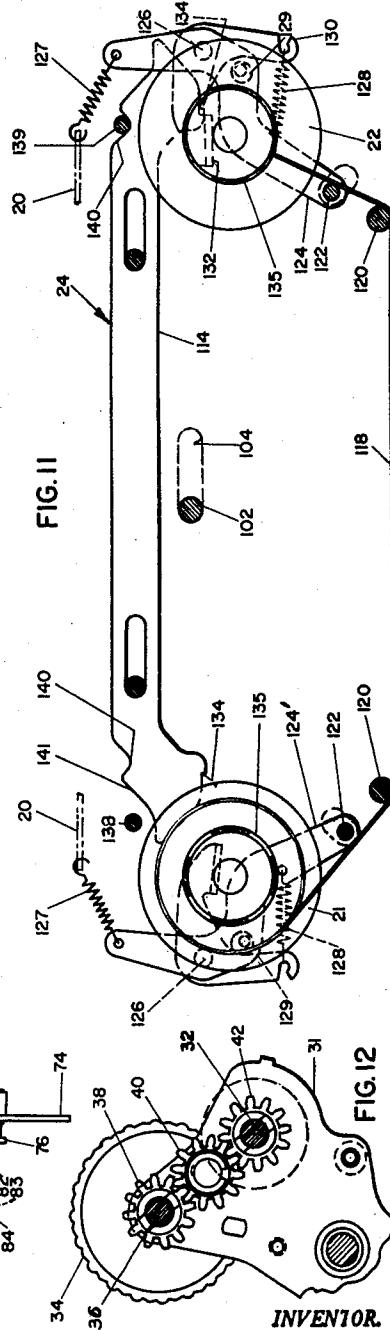


FIG. 12

INVENTOR.
RALPH L. SCHULTZ
BY
Gradolph, Love & Rogers
ATTORNEYS

June 1, 1965

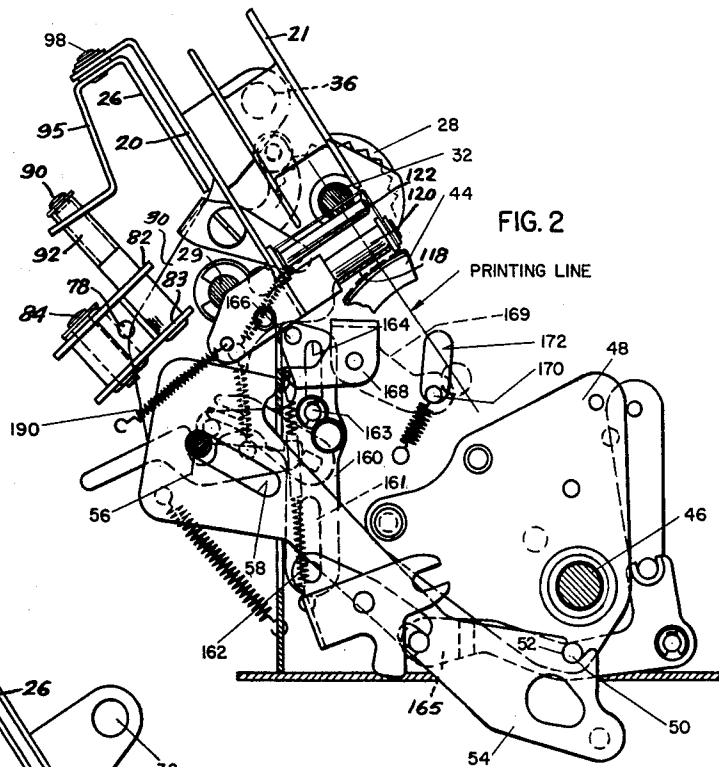
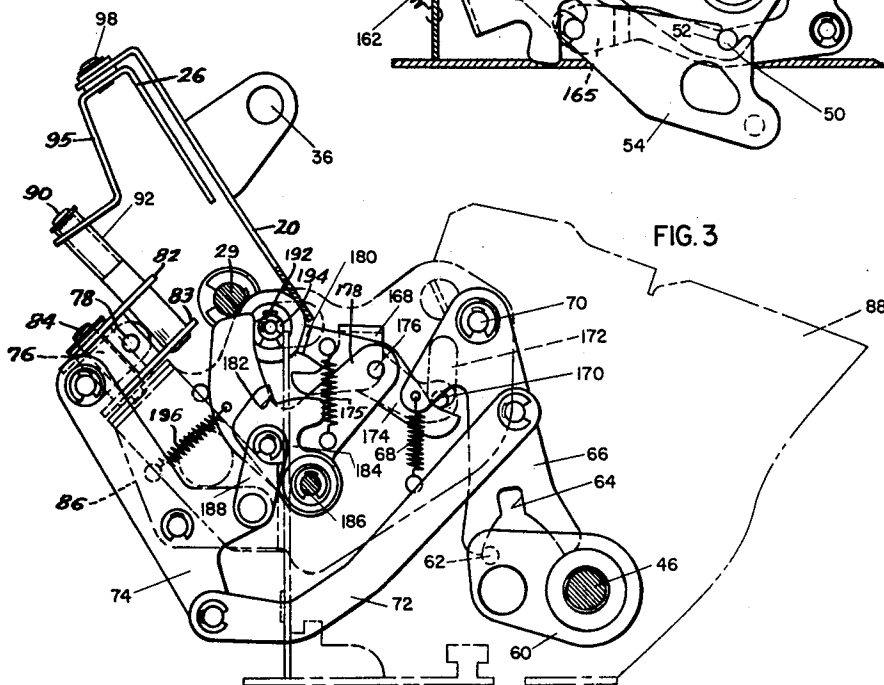
R. L. SCHULTZ

3,186,533

CARRIAGE AND RIBBON MECHANISM FOR CALCULATING MACHINES

Original Filed Nov. 1, 1960

4 Sheets-Sheet 2



INVENTOR.

RALPH L. SCHULTZ

BY

Bradolph, Love & Rogers
ATTORNEYS

June 1, 1965

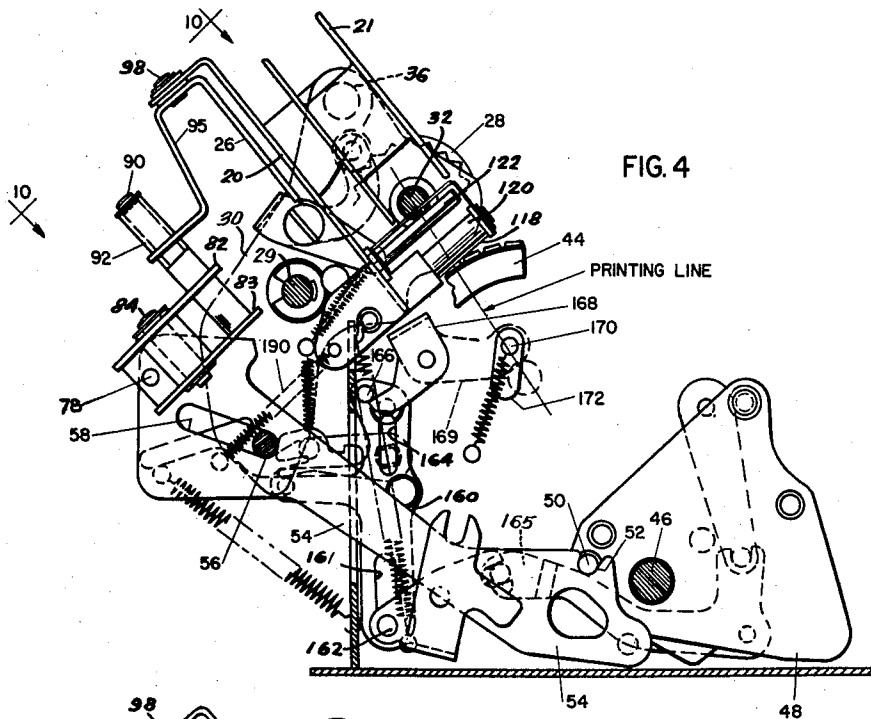
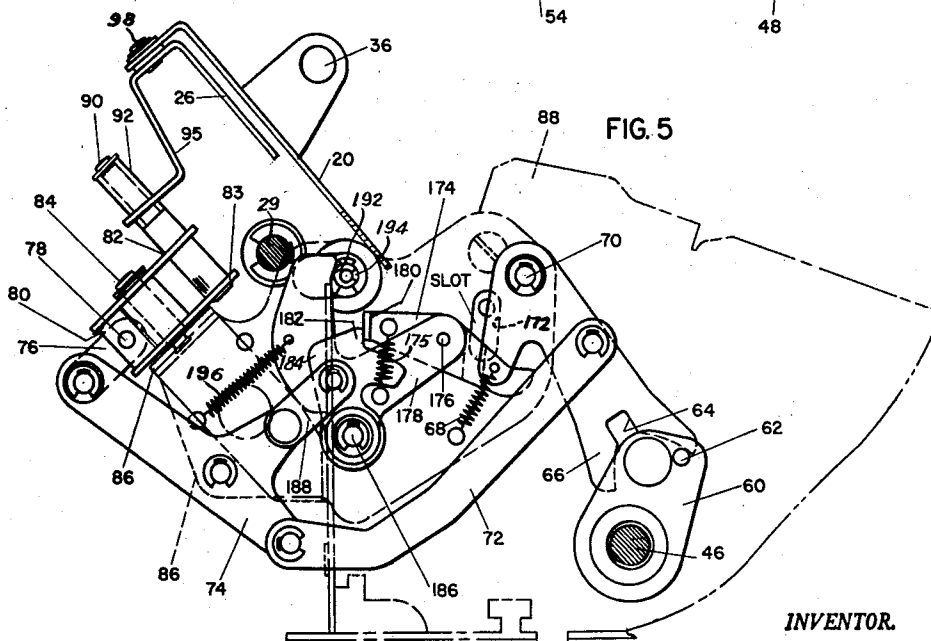
R. L. SCHULTZ

3,186,533

CARRIAGE AND RIBBON MECHANISM FOR CALCULATING MACHINES

Original Filed Nov. 1, 1960

4 Sheets-Sheet 3



INVENTOR.

RALPH L. SCHULTZ

BY

Gradochk, Love & Rogers

ATTORNEYS

June 1, 1965

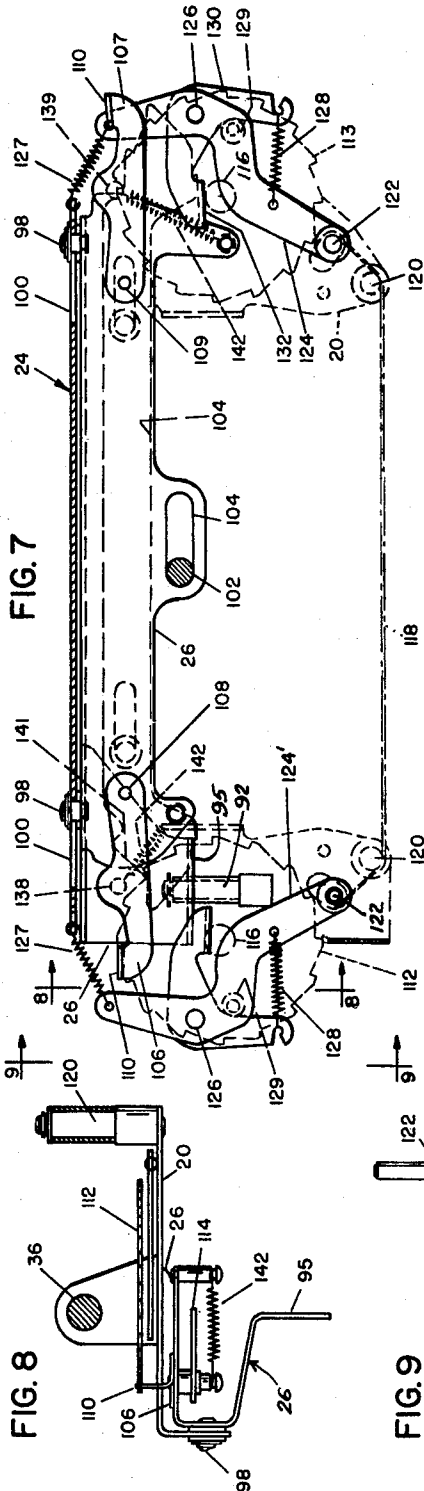
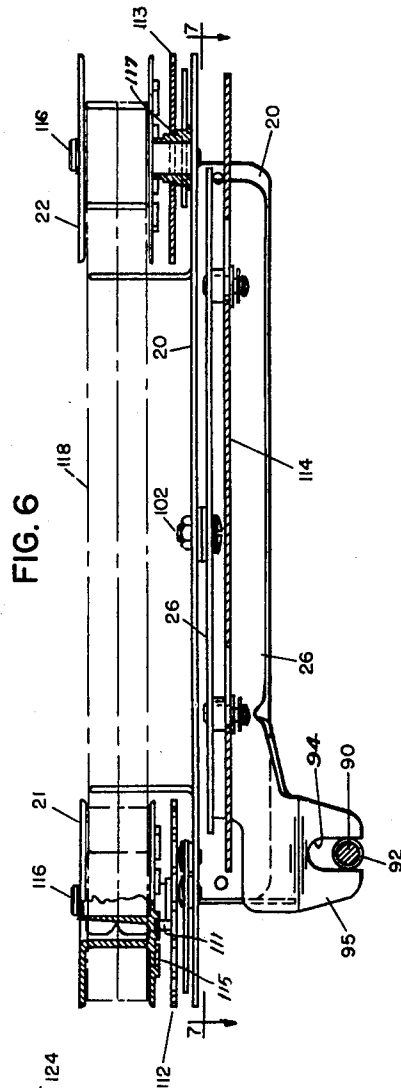
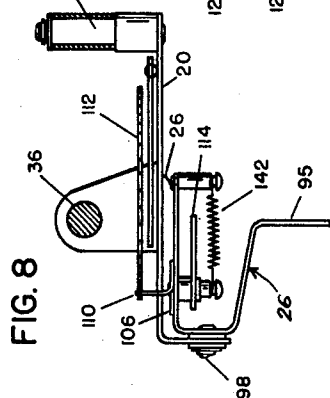
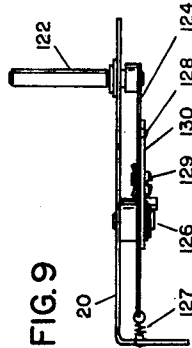
R. L. SCHULTZ

3,186,533

CARRIAGE AND RIBBON MECHANISM FOR CALCULATING MACHINES

Original Filed Nov. 1, 1960

4 Sheets-Sheet 4



INVENTOR.
RALPH L. SCHULTZ
BY
Bradolph, Love & Rogers
ATTORNEYS

1

2

3,186,533

CARRIAGE AND RIBBON MECHANISM FOR CALCULATING MACHINES

Ralph L. Schultz, Chicago, Ill., assignor to Victor Comptometer Corporation, a corporation of Illinois
Original application Nov. 1, 1960, Ser. No. 66,635, now Patent No. 3,145,651. Divided and this application May 27, 1964, Ser. No. 370,574
4 Claims. (Cl. 197-157)

The invention relates generally to carriage and ribbon feed operating mechanisms for calculating machines, and more particularly to an improved means for shifting a platen into printing engagement with the type under controls such that amounts subtracted and negative totals are printed in a color (such as red) different from that in which the added items and totals are printed (in black). This application is a division of copending application Serial No. 66,635, filed November 1, 1960, now Patent No. 3,145,651.

An object of the invention is to provide an improved mechanism, responsive to the setting of the control keys, for shifting a ribbon spool supporting deck to a position where the red portion of the ribbon will be in position to be pressed against the record tape by the type.

A further object is to provide an improved ribbon supporting and actuating means in which a change of ribbon may be effected very easily and rapidly.

Other objects and advantages will appear from the following description, reference being had to the accompanying drawings, in which

FIG. 1 is a top view of the ribbon feeding mechanism, showing its relation to the platen and printing type;

FIG. 2 is a generally left side elevational view of the printing and platen operating mechanism of the machine, portions thereof being shown in section;

FIG. 3 is a side elevational view of the drive mechanism for effecting ribbon feed, the parts being shown in normal position;

FIG. 4 is a view similar to FIG. 3, showing the parts in position for printing the items or totals in red;

FIG. 5 is a view similar to FIG. 3, showing the parts in printing position;

FIG. 6 is a fragmentary sectional view, taken generally on the line 6-6 of FIG. 1;

FIG. 7 is a sectional view, taken on the line 7-7 of FIG. 6;

FIG. 8 is a fragmentary sectional view, taken on the line 8-8 of FIG. 7, the figure being rotated 90° counterclockwise;

FIG. 9 is a fragmentary end elevational view, taken on the line 9-9 of FIG. 7, this figure likewise being rotated 90° counterclockwise;

FIG. 10 is a view taken on the line 10-10 of FIG. 4;

FIG. 11 is a sectional view showing a complete length of ribbon wound on the left-hand spool and completely unwound from the right-hand spool; and

FIG. 12 is a fragmentary sectional view, taken on the line 12-12 of FIG. 1.

The present invention is particularly adapted for use on adding and calculating machines having a platen operating mechanism for pressing the platen against the type, generally of the kind disclosed in Lippert Patent No. 2,318,000.

The general organization of the mechanism for controlling ribbon feed and reversing, and also for controlling the "red" and "black" printing mechanism, is disclosed in FIG. 1 as comprising a deck 20 providing a support for ribbon spools 21 and 22, a ribbon feed reversing mechanism 24, and the power means including a generally channel-shaped slide 26 (FIG. 10).

A platen 28 (FIGS. 1, 2, and 4) is rotatably mounted in

a pair of carriage frame plates 30, 31, which are mounted on the machine frame on pivots 29, the platen shaft 32 being rotated to advance and retract the paper tape in the manner shown in the aforesaid patent, through pawl and ratchet means in the customary manner, or manually by a twirler knob 34. The twirler knob is suitably nonrotatably secured to a shaft 36, and through pinion 38 (FIG. 12) direction reversing idler gear 40, and pinion 42 mounted on the platen shaft 32, permits manual adjustment of the position of the record tape.

The power for swinging the platen 28 about pivots 29 against the differentially positioned type of the type carriers 44 is derived from the rockable main shaft 46 (FIGS. 2, 3, and 5) which has a plate 48 secured thereto, the plate having a sidewardly extending stud 50 normally engaging a notch 52 in an actuating link 54. In the usual construction, the plate 48, stud 50, notch 52, and link 54 are duplicated for the right-hand side of the machine, but this mechanism for the left-hand side only of the machine will be described in detail. The link 54 is movable rearwardly upon the forward stroke (clockwise movement of rock shaft 46) of the machine, from the position shown in FIG. 2 to the position shown in FIG. 4, being guided by a stud 56 extending through slot 58 formed in the link 54. For purposes of adjustment the stud 56 may be eccentric.

The rearward end of the link 54, through the forward end of its slot 58, engages the stud 56 which is attached to the carriage frame plate 30, and operates to swing the platen 28 toward the type carriers 44 to effect a printing impression, as shown in FIG. 4.

The power for feeding the ribbon is derived from the main shaft 46 through a crank 60 fixed thereto and having a stud 62 cooperable with an inverted generally Y-shaped notch 64 formed at the forward end of a crank 66 which is biased to swing counterclockwise by a spring 68. It will be noted that the notch 64 is provided with initial and terminating surfaces which are effectively concentric with the shaft 46 and thus provide that the crank 66 shall not be operated during the initial, nor during the final, portions of the forward (clockwise, FIG. 3) stroke of the main shaft 46, but that when the stud 62 engages in the central portion of the notch 64, the crank 66 is swung counterclockwise (FIG. 3) about its pivot 70, to the position shown in FIG. 5.

The forward end of a link 72 is pivotally connected to the arm 66, and its rearward end is connected to a bell crank 74, so that, during the forward stroke of the main shaft 46, the bell crank 74 is pivoted counterclockwise to the position shown in FIG. 5. The rearward arm of the bell crank 74 has pivoted thereto a link 76 which in turn is pivotally connected by a stud 78 to a pivot stud 80, the latter having end bearings in similar bell cranks 82 and 83 pivoted on a stud 84 mounted on a bracket 86, the latter being suitably secured to the left-hand frame plate 38 of the machine. The link 76, studs 78 and 80, thus form a universal joint.

As best shown in FIG. 10, the cranks 82 and 83 carry a stud 90 having a roller 92 projecting through a slot 94 in an offset arm 95 forming part of the power slide 26. This slide is suitably mounted for transverse reciprocatory motion on a pair of studs 98 extending through suitable elongated slots 100 (FIG. 10) and by an additional central stud 102 (FIG. 1) projecting through a slot 104.

As best shown in FIGS. 1 and 7, the power slide 26 has a pair of pawls 106, 107 pivotally secured thereto at 108, 109, respectively, these pawls having sidewardly bent lugs 110 engageable with ratchet wheels 112, 113. Depending upon the position of a ribbon feed reversing slide 114, one or the other of the pawls 106, 107 will be in position for engagement with its associated ratchet wheel 112, 113. The ratchet wheels 112, 113, and the

3

ribbon spools 21, 22 are mounted on studs 116, the spools being nonrotatably connected to the ratchet wheels by pins 111 on the ratchet wheels and mating recesses 115 in the spools, but easily removable for replacement of the ribbon. The ratchet wheels 112, 113 have enlarged hubs 117 (right, FIG. 1) which are engaged by a pair of scissor arms 144 conformed to engage the hub 117 of the ratchet wheel 113, being drawn together by a spring 146, the inner ends of these arms pivotally engaging a pair of studs 148. The spring 146 applies sufficient force to the arms 144 frictionally to hold the ratchet wheel in the position to which it is rotated by its pawl 107. The ratchet wheel 112 for the left-hand ribbon spool is similarly held frictionally in the position to which it has been moved.

The inked ribbon 118 is wound up on one spool or the other in the customary manner, and the direction of feed of the ribbon is determined by the ribbon reversing mechanism 24 (FIG. 11). The ribbon 118 is guided by pins 120 (FIGS. 7 and 11) to lie between the platen 28 and the type carriers 44. When the spool 21 has substantially all of the ribbon wound thereon, a pin 122 carried by a lever 124, pivoted on a stud 126, is in the position shown in FIG. 11.

While the ribbon reversing mechanism is herein particularly shown and described with reference to the right-hand ribbon spool 22, it will be understood that a complementary mechanism, operating in a similar manner, is provided for the left-hand spool 21.

The right-hand lever 124 is urged to swing counterclockwise (the left-hand crank 124' clockwise, FIGS. 7 and 11) by a tension coil spring 127 anchored to the lever 124 as well as to the deck 20, thus keeping pin 122 in contact with ribbon 118 when a small number of turns of ribbon is left on hub 135 of ribbon spool 22. (This description will continue by referring only to the right-hand spool, it being understood that the construction and operation of the left-hand spool mechanism is reciprocal.) The bell crank 130, having a sidewardly extending lug 132, is also pivoted on stud 126 and is urged by a tension coil spring 128 against a stud 129 eccentrically mounted on lever 124. The eccentric stud 129 permits adjustment of the movement of lug 132 for effective engagement with a shoulder 134 of reversing slide 114 during the ribbon feed reversing operation.

From FIG. 11 it will be quite apparent that when the ribbon spool 21 has a large number of turns of ribbon 118, the direction in which the ribbon passes from the spool 21 to the pin 120 is at a substantially greater angle than when the ribbon has substantially unwound from hub 135 of the ribbon spool 22. This change of direction of the movement of the ribbon web results in swinging the arm 124 clockwise to the position shown on the right ribbon spool 22 of FIG. 11, thereby biasing the bell crank 130 to swing clockwise to cause its lug 132 to move into position for engagement with shoulder 134 of the reversing slide 114 during the return stroke of the power slide 26.

As shown on the right side in FIG. 11, the heel adjacent to the shoulder 134 of the reversing slide 114 constrains the lug 132 of bell crank 130 from a clockwise motion. However, the ribbon 118 has swung arm 124 clockwise, thereby stretching the spring 128 and disengaging the crank 130 from contact with the eccentric stud 129. As soon as the reversing slide 114 moves to the left, carried by the power slide 26 during the following machine cycle, the spring 128 pulls crank 130 clockwise against stud 129 so that lug 132 moves into the path of shoulder 134 of the reversing slide 114. Toward the end of the return stroke of the power and reversing slides, the lug 132 engaging the shoulder 134 prevents the reversing slide 114 to return to its rightmost position (FIGS. 7 and 11) and assumes a position whereby stud 138 is lodged in notch 140 at the left side of reversing slide 114.

4

As shown in FIG. 7, the left-hand feed pawl 106 has a sidewardly extending stud 138, while the right-hand feed pawl 107 has a similar stud 139. As shown in FIG. 11, the feed reversing slide 114 is provided with a notch 140 (at each end thereof) for the reception of the studs 138 and 139, thus serving as detents to hold the reversing slide 114 in the position to which it has been shifted, and in addition, to permit a tension spring 142 (FIG. 7) to lower the particular pawl 106 or 107 to a position such that it may engage its associated ratchet wheel 112, 113. In FIG. 7, the left-hand ribbon feed pawl is shown in position to have its lug or tooth 110 in position for effective engagement with the ratchet wheel 112, while the spring 142 at the right is extended by virtue of the engagement of its stud 139 in the notch 140 of the reversing slide 114.

After the reversing slide 114 is shifted to the left, stud 138 of feed pawl 106 is lodged in notch 140 at the left of slide 114. This shifting causes the inclined surface 141 of slide 114 to move stud 138 of pawl 106 clockwise into the adjacent notch 140, thus camming lug 110 of the pawl 106 out of engagement with ratchet wheel 112, while stud 139 of pawl 107 (at the right side of FIGS. 7 and 11) leaves its notch 140, and lug 110 of pawl 107 is forced into engagement with its associated ratchet wheel 113 by the pull of spring 142. During the ensuing machine operations, the pawl 107 actuated by the reciprocatory motion of the power slide 26 will, through its lug 110, cause the ratchet wheel 113 to rotate counterclockwise, thus rewinding the right-hand spool 22 with the ribbon web 118 and unwinding the left-hand spool 21.

In review, it may be emphasized that, as shown in FIG. 7, the left-hand feed pawl 106 has a sidewardly extending stud 138, while the right-hand feed pawl 107 has a similar stud 139. As shown in FIG. 11, the feed reversing slide 114 is provided with a notch 140 (at each end thereof) for the reception of the studs 138 and 139, which thus serve as detents to hold the reversing slide 114 in the position to which it has been shifted, and in addition, to permit a tension spring 142 to lower the particular pawl 106 or 107 to a position such that it may engage its associated ratchet wheel 112, 113. In FIG. 7, the left-hand ribbon feed pawl is shown in position to have its lug or tooth 110 in position for effective engagement with the ratchet wheel 112, while the spring 142 is extended by virtue of the engagement of its stud 139 with the raised edge of the reversing slide 114.

In order to secure printing of items subtracted and negative totals in a distinctive color, the customary two color ribbon is employed, the lower portion being colored red and the upper portion black. It is therefore necessary, upon such negative indications, to move the ribbon deck upwardly.

Upon each subtract operation or negative total operation, a slide 160 is moved downwardly (FIG. 2), this slide being suitably mounted for generally vertical sliding motion on a stud 163 extending through a suitably elongated slot 164. A second stud 162 engageable in slot 161 connects the slide to linkage 165 controlling the type sector 44 bearing the function indicating symbol. The manner in which this slide is operated is fully disclosed in the prior patent to Thomas O. Mehan No. 2,550,581, being shown as part 222 in FIG. 4 thereof. The slide shown in said patent is modified by the addition of a stud 166. Upon downward movement of the slide 160, the stud 166 engages the rearwardly extending arm of a bail-form bell crank lever 168, swinging the latter counterclockwise. Upon such movement the rearwardly extending arm 169 of the crank 168 moves a stud 170 upwardly through a clearance slot 172, to the position shown in FIG. 4, and thus permits counterclockwise pivotal movement of a lever 174 (FIG. 5) under force of spring 175 about its pivot stud 176 mounted on a bell crank 173, causing a sidewardly extending lug 180 on its rearwardly

5

extending arm to swing to a position in which it may be engaged by a projection 182 on a power driving arm 184. The arm 184 is pivoted on a stud 186 and is connected by a link 188 with the bell crank lever 74 which, as previously described, is oscillated during each cycle of operation of the machine.

The positioning of the lug 180 in front of the projection 182 results in forming a positive driving connection for swinging the ribbon deck 20 counterclockwise (FIG. 5) about the pivot shaft 36 a sufficient distance to bring the lower red portion of the ribbon into registry with the printing line, as shown in FIG. 4. The clockwise movement of the projection 182 pivots the stud 176 and therefore the bell crank 178 in the clockwise direction against the force exerted by restoring spring 196. This brings bell crank face 192 against roller 194 carried on the underside of the ribbon deck 20 to swing the latter from the FIG. 2 position to that of FIGS. 4 and 5 to bring the red portion of the ribbon 118 into printing registry. By reference to the aforesaid patent No. 2,550,581, it will be clear that such shifting of the ribbon deck will take place upon initiation of each subtraction cycle and upon each negative total taking cycle. A bias spring 190 urges the ribbon deck toward its home position.

While there has been described what is believed to be the preferred embodiment of the present invention, it will be appreciated that various changes and modifications may be made therein, and it is contemplated to cover in the appended claims all such changes and modifications as fall within the true spirit and scope of the invention.

What is claimed as new, and desired to be secured by United States Letters Patent, is:

1. In a calculating machine having a type sector, a platen, a main shaft, and a deck carrying a ribbon with a black portion normally positioned along a printing line between the platen and sector and with a red portion, the improvement comprising a pair of pivotal carriage frame plates supporting the platen for pivotal movement toward the type sector, means pivotally mounting the deck on the frame plates, a slide having a stud and shifted during each subtracting and negative total taking cycle of the machine, a first lever pivoted by the stud upon shifting of the slide, a pivotal power driving arm, a first linkage connecting the driving arm to the deck, a second linkage connecting the driving arm to the main shaft pivoting the arm about its axis during adding cycles, and a second lever pivoted into engagement with the driving arm upon pivotal movement of the first lever transmitting pivotal movement of the power driving arm to the first linkage to pivot the deck on the frame plates to a position in which the red portion of the ribbon lies over the printing line.

2. In a calculating machine having a type sector, a platen, a main shaft, a deck carrying a ribbon with a black portion normally positioned along a printing line between the platen and sector and a red portion, a ribbon feeding and reversing mechanism carried by the deck, and linkage connecting the mechanism to the main shaft for feeding of the tape in timed relation with the operation of the machine, the improvement comprising a pair of pivotal carriage frame plates supporting the platen for pivotal movement toward the type sector, means pivotally mounting the deck on the frame plates, a slide having a stud and shifted during each subtracting and negative

6

total taking cycle of the machine, a first lever pivoted by the stud upon shifting of the slide, a pivotal power driving arm connected to and normally pivoted by the linkage during operation of the main shift, a second lever pivoted into engagement with the power arm upon pivotal movement of the first lever, and a third lever pivotally mounting said second lever and movable to pivot the deck on the frame plates to a position in which the red portion of the ribbon lies over the printing line.

3. In a calculating machine having a type sector, a platen, a deck carrying a ribbon with a black portion normally positioned along a printing line between the platen and the sector and with a red portion, and a main shaft having a predetermined movement for each machine cycle, the improvement comprising a pair of pivotal carriage frame plates supporting the platen for pivotal movement toward the type sector, means pivotally mounting the deck on the frame plates, a slide having a stud and being shiftable during each subtracting and negative total taking cycle of the machine, a first lever pivoted by the stud upon shifting of the slide, a pivotal power driving arm, linkage connecting the driving arm to the deck and to the main shaft and pivoting the arm about its axis during each machine cycle, a second lever mounted on a movable pivot and pivotal into position to be engaged by the driving arm upon pivotal movement of the first lever, and means connected to the movable pivot to cause the linkage to pivot the deck on the frame plates to a position in which the red portion of the ribbon lies over the printing line.

4. In a calculating machine having a type sector, a platen, a deck carrying a ribbon with a black portion normally positioned along the printing line between the platen and sector and a red portion, a main shaft having a predetermined movement for each machine cycle, a ribbon feeding and reversing mechanism carried by the deck, and linkage connecting the mechanism to the main shaft for feeding of the tape in timed relation with the operation of the machine, the improvement comprising a pair of pivotal carriage frame plates supporting the platen for pivotal movement toward the type sector, means pivotally mounting the deck on the frame plates, a slide having a stud and mounted for shifting movement during each subtracting and negative total taking cycle of the machine, a first lever pivoted by the stud upon shifting of the slide to move a blocking stud out of blocking position, a pivotally mounted power driving arm connected to and normally pivoted by the linkage during operation of the main shaft, and a second lever mounted on a movable pivot and pivotal into position for engagement with the power arm upon pivotal movement of the first lever, whereby pivotal movement of the power driving arm causes the linkage to pivot the deck on the frame plates to a position in which the red portion of the ribbon lies over the printing line.

References Cited by the Examiner

UNITED STATES PATENTS

1,352,593	9/20	Fuhrmann	235—60.19
2,011,310	8/35	Anderson	235—60.19
2,747,718	5/56	May	197—157
2,875,686	3/59	Gross et al.	197—157 X

ROBERT E. PULFREY, *Primary Examiner.*