Nov. 18, 1930. G. F. HANDLEY 1,781,725

TYPEWRITING MACHINE

Original Filed Dec. 15, 1928 2 Sheets-Sheet 1

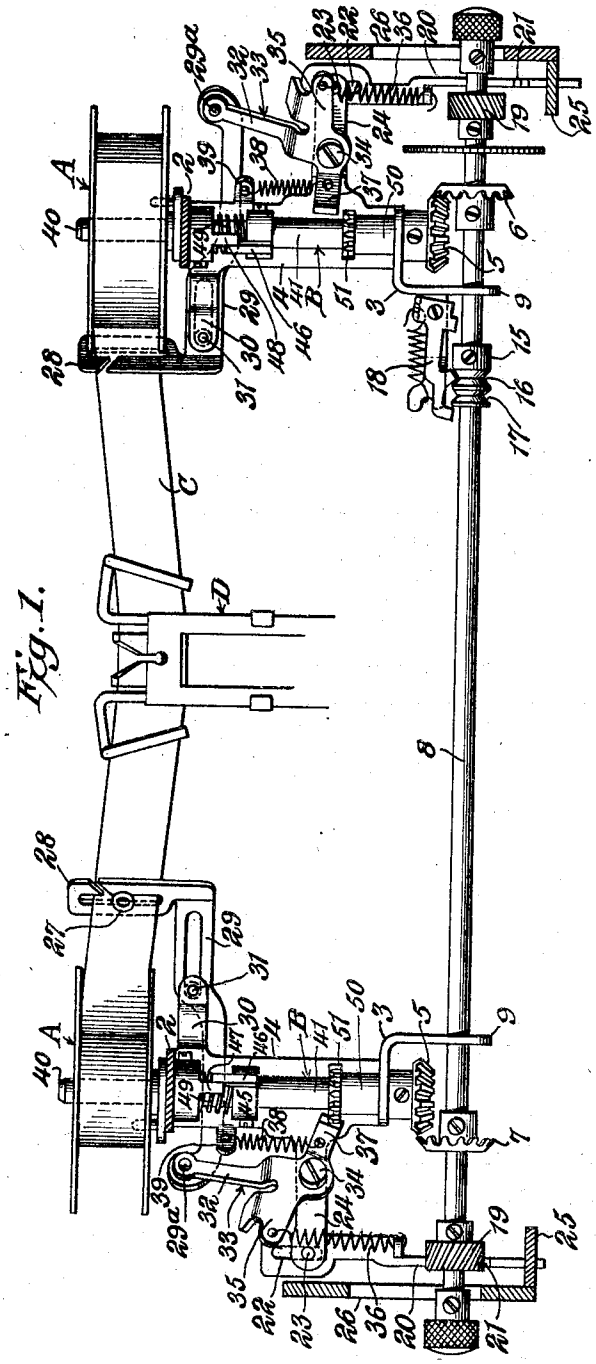

Fig. 1.

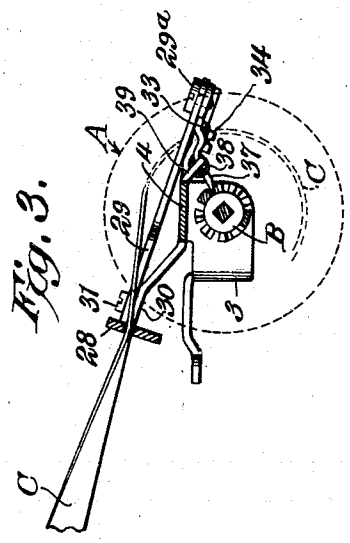

Fig. 3.

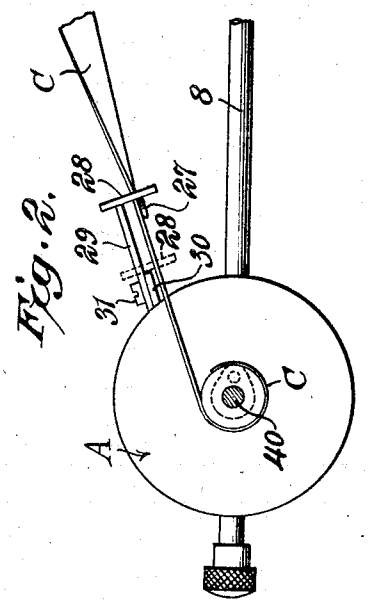

Fig. 2.

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Fig. 8.

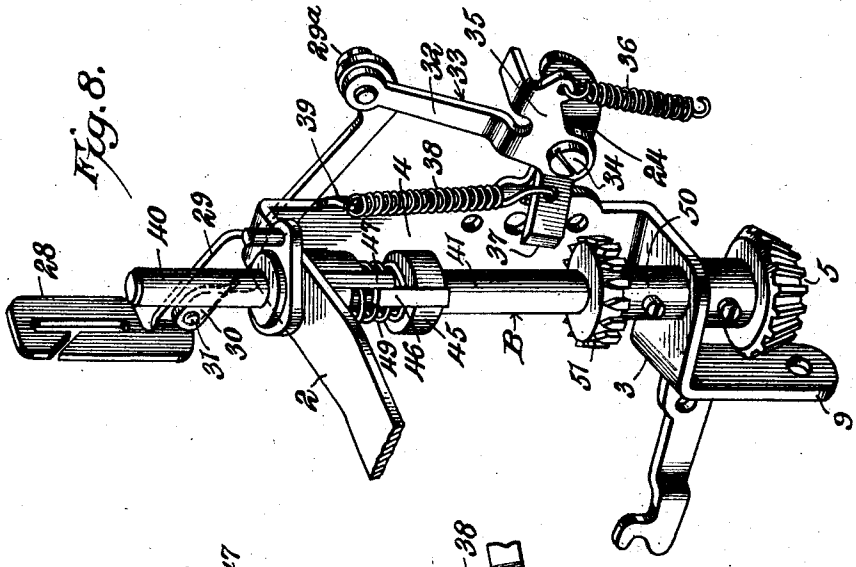


Fig. 5.

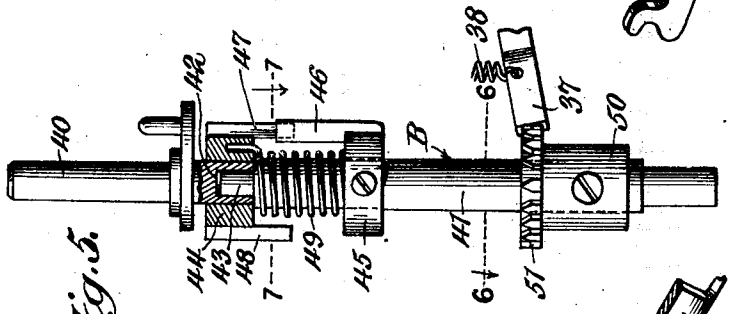


Fig. 7.

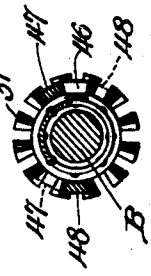


Fig. 4.

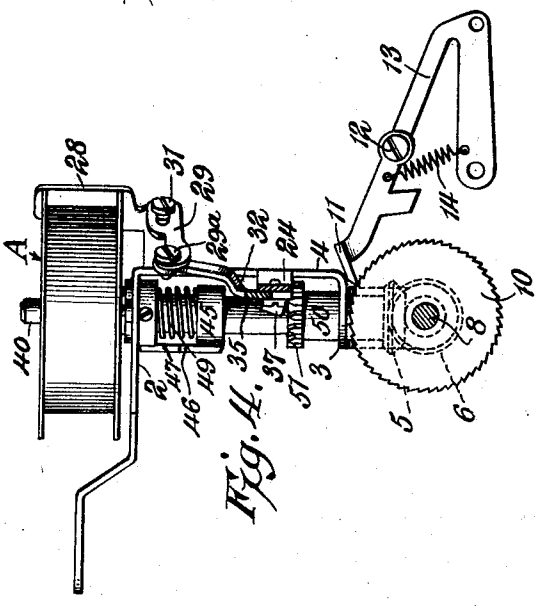
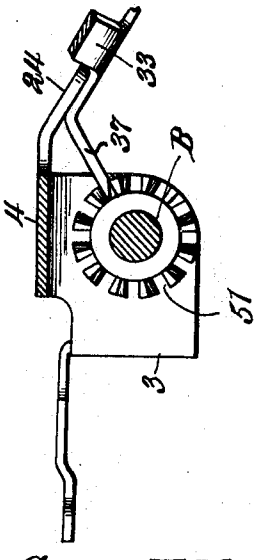


Fig. 6.



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Patented Nov. 18, 1930 1,781,725

UNITED STATES PATENT OFFICE

GEORGE F. HANDLEY, OF GLENDALE, NEW YORK, ASSIGNOR TO ROYAL TYPEWRITER COMPANY, INC., OF NEW YORK, N. Y., A CORPORATION OF NEW YORK

TYPEWRITING MACHINE

Original application filed December 15, 1928, Serial No. 326,318. Divided and this application filed November 19, 1929. Serial No. 408,248.

This invention relates to improvements in typewriting machines generally and in machines of analogous arts, although more particularly to improvements in automatic reversing ribbon mechanisms such as is disclosed in my Patent 1,570,218, January 19, 1926, and constitutes a division of my copending application Serial No. 326,318 filed December 15, 1928.

In the construction of my prior patent, a button or other projection, which is located on the ribbon adjacent the unwinding end thereof, is moved by the ribbon into contact with an arm and the latter is thereby moved against the tension of the spring to effect the automatic operation of the ribbon reversing mechanism. Immediately following the completion of the reversing operation, the arm is returned by the spring to its normal or retracted position. The return movement of this arm, by reason of its contact with the button, causes that portion of the ribbon between the now active ribbon spool and the button to be formed into a loose loop-like formation or slack portion which must be taken up by the rotation of the spool before the ribbon begins its actual reverse feeding movement. The ribbon, where it is engaged by the type, remains stationary until said slack is taken up. This failure of the ribbon to feed results in the ribbon being perforated by the type in this one spot.

It is, therefore, the principal object of the present invention to provide an automatic take-up mechanism for said ribbon loop or slack portion, which will function substantially instantaneously and immediately after the operation of the reversing mechanism, and simultaneously with the return of the ribbon controlled means, whereby the spool will immediately begin its feeding movement for the entire ribbon and the possibility of the type perforating the ribbon will be thereby avoided.

In the accompanying drawings:

Figure 1 is a front elevation showing an automatic ribbon reversing mechanism embodying my invention, the view showing the reversing mechanism in operation;

Figure 2 is a top plan view showing a part of the left hand ribbon spool, the ribbon, and the ribbon controlled arm which actuates the reversing mechanism;

Figure 3 is a horizontal section taken below the right hand spool and showing the ribbon take-up mechanism;

Figure 4 is an end view partly in section showing the intermittent ribbon feeding means;

Figure 5 is a front elevation of the spool shaft, a portion thereof being shown in section;

Figure 6 is a horizontal sectional view taken on the line 6—6 of Figure 5;

Figure 7 is a horizontal sectional view taken on the line 7—7 of Figure 5, and

Figure 8 is a perspective view of the right hand spool shaft and the associated ribbon controlled means for the reversing mechanism.

Referring to the drawings, the ribbon reversing mechanism shown therein is generally of the same construction as is disclosed in my prior patent referred to above, and, therefore, I have not shown a typewriting machine to which the ribbon reversing mechanism is applied.

This ribbon reversing mechanism comprises generally a pair of ribbon spools A, A which are respectively supported on vertical shafts B, B which in turn are each supported in offset arms 2 and 3 of a bracket 4 attached to the type bar segment. Fixed to the lower end of each spool shaft B is a bevel gear 5 with one of which is adapted to mesh a bevel gear 6 at the right hand side of the machine and with the other of which is adapted to mesh a similar bevel gear 7 at the left hand side of the machine, the gear 7 facing in the opposite direction to the gear 6. The gears 6 and 7 are fixed to a driving shaft 8 which is journaled in downwardly extending arms 9 of the brackets 4. The shaft 8 is free to rotate in the arms 9 and may be moved longitudinally therein.

Near the right hand end the shaft 8 has fixed thereon a large ratchet wheel 10 with fine teeth which are engaged by a pawl 11 pivotally connected at 12 to a universal bar 13 which is operated at each depression of the

usual type key levers. A spring 14 yieldably retains the pawl 11 in engagement with the teeth of the ratchet wheel 10. During printing the pawl 11 will operate to rotate the shaft 8, which rotation will be transmitted to one or to the other of the ribbon spool shafts B, depending upon which gear 6 or 7 is in mesh with its cooperative bevel gear 5.

Adjacent the bevel gear 6, the shaft 8 is provided with a fixed collar 15 having two grooves 16 and 17. A spring pressed detent 18 is pivotally connected to the bracket 4 and cooperates with the grooves 16 and 17 to hold the shaft 8 in either of its longitudinal or endwise adjustments, whereby either the gear 6 will be disposed in mesh with the gear 5, or the gear 7 will be disposed in mesh with the other gear 5. Thus, when the shaft 8 is automatically moved endwise to reverse the rotations of the spool shafts B, said shaft 8 will be retained by the detent 18 in its adjusted position. Fixed to the shaft 8, at each end thereof, is a spiral gear 19 and associated with each gear is a vertically movable pawl 20, having a tooth 21 adjacent its lower end. The upper end of the pawl 20 is provided with a longitudinal slot 22 through which a pin 23 extends, said pin being fixed to an arm 24 of the bracket 4, and the lower end of the pawl is guided in an opening formed in a horizontal plate 25 attached to the machine frame 26. Thus, the pawl 20 is guided for vertical movements relative to the associated gear 19. Consequently, when the pawl is raised and the tooth 21 is brought into engagement with the teeth of the gear 19, the rotation of the drive shaft 8 will cause a gear tooth to cam against the stationary tooth 21 of the pawl and thereby cause the shaft to move longitudinally, thereby coupling the gears 5 and 6 or 5 and 7, depending upon the direction of longitudinal movement of said shaft. Thus, the full ribbon spool will be disconnected and the empty spool will be rotated in the direction to wind the ribbon thereon.

The reversing mechanism above described is duplicated at opposite sides of the machine, but reversibly arranged in order that operation of the same will move the shaft 8 alternately in opposite directions.

The ribbon reversing mechanism is controlled and actuated by the ribbon C which is fed from one spool to the other, the ribbon passing through a ribbon vibrator D. The ribbon near each end is provided with a button or projection 27, which, as the ribbon is nearly fed from one spool, engages a ribbon guide 28, and moves the latter in a direction away from the spool. This guide 28 is fixed to one end of an arm 29 which is supported on an arm 30 of the bracket 4 for straight line movements in a horizontal plane through the medium of a pin and slot connection 31 between said arms. The opposite end of the arm 29 is pivotally connected as at 29a to the upper end of a vertical arm 32 of a bell crank lever 33 which is pivoted at its angle as at 34 to the bracket arm 24. An arm 35 of said lever 33 is connected to the upper end of the coil spring 36, the lower end of said spring being connected to and yieldably supporting the pawl 20. The bell crank lever 33 is provided with a third arm 37 which constitutes a latch and this latch arm 37 is connected to the lower end of a coil spring 38, the upper end of the spring being connected to an ear 39 on the bracket 4.

Thus, when the button or projection 27 is moved outwardly by the feeding operation of the ribbon it engages the ribbon guide 28 and moves the arm 29 in a straight line which in turn rocks the lever 33 against the tension of the spring 38, and the arm 35 of said lever 33 through the medium of the spring 36 raises the pawl 20 to engage the tooth 21 thereof with a tooth of the spiral gear 19 and thereby move the driving shaft 8 longitudinally to effect a coupling of the driving gears of the associated spool and an uncoupling of the driving gears of the other spool. Simultaneously with the coupling of the gears, the spring 38 effects a quick return of the ribbon guide 28, arm 29 and lever 33 to their normal positions, this movement disconnecting the spiral gear from the pawl 20. The ribbon guide in its return movement pushes the button or projection 27 and causes the formation of a loop or slack portion in the ribbon between the spool and the guide.

This slack or loop portion must be taken up by the rotation of the spool before the main portion of the ribbon begins its feeding movement, because that portion of the ribbon which is engaged by the type remains stationary until the slack above described has been taken up, and as a result the continued striking of the type against the stationary part of the ribbon results in said ribbon being perforated by the type.

In order to automatically take up this slack in the ribbon substantially instantaneously and immediately following the operation of the reversing mechanism I have provided a ribbon slack take-up mechanism which is operable simultaneously with the return movement of the ribbon control means. To this end, each spool shaft B is formed of upper and lower sections 40 and 41 respectively, the lower end of the upper section being provided with a seat 42 for receiving the reduced upper portion 43 of the lower section. Fixed to the lower portion of the upper section 40 is a collar 44 and fixed to the upper portion of the lower section is a collar 45. An upwardly extending drive finger 46 is fixed to the collar 45 and is adapted to engage one or the other of spaced fingers 47 and 48 which are fixed to and depend from the collar 44. A coil spring

49 surrounds the lower section 41 between the collars 44 and 45 and the ends of this spring are respectively fixed to said collars. Thus the upper section 40 of said shaft is adapted to be rotated in either direction relative to the lower section 41, the spring 49 serving to normally retain the driving finger 46 in engagement with the stop finger 47 to thereby rotate the upper shaft section 40. Thus, upon rotation of the lower shaft section 41 of one spool shaft in a clockwise direction, the upper shaft section 40 will be rotated in the same direction, whereas the lower section of the other spool shaft will be rotated in an anti-clockwise direction.

It is desirable to retain the lower section 41 of the spool shaft against rotation during the forward movement of the ribbon guide 28 so as to permit the ribbon during its feeding movement to rotate the upper section 40 against the tension of the spring 49. I have, therefore, fixedly attached to lower section 41 a collar 50 having a circular rack 51 fixed to the upper end thereof. The latch arm 37 which is fixed to the bell crank lever 33 functions to engage between a pair of teeth of the circular rack 51 when the ribbon guide 38 is moved to its limit under the influence of the ribbon button or projection 37. Thus, the lower section 41 of the shaft is held against movement while the upper section 40 is being rotated under the influence of the ribbon feeding action. Consequently, as soon as the ribbon guide begins its return movement due to the operation of the reversing mechanism, the spring 49 will reversibly rotate the upper section 40 of the shaft together with the ribbon spool until the drive finger 46 reengages the stop finger 47 and thereby quickly take up the slack in the ribbon between the ribbon guide 28 and the spool during the return movement of said ribbon guide.

From the foregoing it will be observed that I have provided a spring which is connected to the ribbon spool, and that this spring is placed under tension when the ribbon control led means is actuated by the ribbon and is effective to rotate the spool to take up the ribbon slack simultaneously with return movement of the ribbon controlled means to its initial position, and that I have provided means for locking the lower section of the shaft against rotation while the upper shaft is being rotated in opposite directions.

I claim:

1. In a typewriter or the like, a ribbon feeding mechanism including a ribbon spool and a ribbon wound thereon, a ribbon reversing mechanism, a movable ribbon-controlled means for operating said reversing mechanism, means for returning the ribbon-controlled means to its initial position immediately following the operation of the reversing mechanism whereby a slack in the ribbon is formed between the spool and the ribbon-controlled means, and a spring connected to the spool and placed under tension when the ribbon-controlled means is actuated by the ribbon and effective to rotate the spool to take up the ribbon slack simultaneously with the return movement of the ribbon-controlled means to its initial position.

2. In a typewriter or the like, a ribbon feeding mechanism including a ribbon spool, a ribbon wound thereon, and a spool shaft comprising upper and lower sections supported for relative rotary movements, the spool being connected to the upper section to rotate therewith, a ribbon reversing mechanism, a movable ribbon-controlled means for operating said reversing mechanism, means for returning the ribbon-controlled means to its initial position immediately following the operation of the reversing mechanism whereby a slack in the ribbon is formed between the spool and the ribbon-controlled means, and a spring interposed between and connected to the upper and lower shaft sections and placed under tension when the ribbon-controlled means is actuated by the ribbon and effective to rotate the spool to take up the ribbon slack simultaneously with the return movement of the ribbon-controlled means to its initial position.

3. In a typewriter or the like, a ribbon feeding mechanism including a ribbon spool, a ribbon wound thereon, and a spool shaft comprising upper and lower sections supported for relative rotary movements, the spool being connected to the upper section to rotate therewith, cooperating stops fixed to the shaft sections to limit the rotation of one section relative to the other, a ribbon reversing mechanism, a movable ribbon-controlled means for operating said reversing mechanism, means for returning the ribbon-controlled means to its initial position immediately following the operation of the reversing mechanism whereby a slack in the ribbon is formed between the spool and the ribbon-controlled means, and a spring interposed between and connected to the upper and lower shaft sections and placed under tension when the ribbon-controlled means is actuated by the ribbon and effective to rotate the spool to take up the ribbon slack simultaneously with the return movement of the ribbon-controlled means to its initial position.

4. In a typewriter or the like, a ribbon feeding mechanism including a ribbon spool, a ribbon wound thereon, and a spool shaft comprising upper and lower sections supported for relative rotary movements, the spool being connected to the upper section to rotate therewith, a ribbon reversing mechanism, a movable ribbon-controlled means for operating said reversing mechanism, means for returning the ribbon-controlled means to its

initial position immediately following the operation of the reversing mechanism whereby a slack in the ribbon is formed between the spool and the ribbon-controlled means, and a coil spring surrounding one shaft section and having its ends respectively connected to both shaft sections and placed under tension when the ribbon-controlled means is actuated by the ribbon and effective to rotate the spool to take up the ribbon slack simultaneously with the return movement of the ribbon-controlled means to its initial position.

5. In a typewriter or the like, a ribbon feeding mechanism including a ribbon spool, a ribbon wound thereon, and a spool shaft comprising upper and lower sections supported for relative rotary movements, the spool being connected to the upper section to rotate therewith, a ribbon reversing mechanism, a movable ribbon-controlled means for operating said reversing mechanism, means for returning the ribbon controlled means to its initial position immediately following the operation of the reversing mechanism whereby a slack in the ribbon is formed between the spool and the ribbon-controlled means, collars respectively fixed to the upper and lower shaft sections, cooperating stops respectively fixed to the collars and arranged in overlapping relation to limit the rotation of one section relative to the other, and a spring connected to the shaft sections and placed under tension when the ribbon-controlled means is actuated by the ribbon and effective to rotate the spool to take up the ribbon slack simultaneously with the return movement of the ribbon-controlled means to its initial position.

6. In a typewriter or the like, a ribbon feeding mechanism including a ribbon spool, a ribbon wound thereon, and a spool shaft comprising upper and lower sections supported for relative rotary movements, the spool being connected to the upper section to rotate therewith, a ribbon reversing mechanism, a movable ribbon-controlled means for operating said reversing mechanism, means for returning the ribbon-controlled means to its initial position immediately following the operation of the reversing mechanism whereby a slack in the ribbon is formed between the spool and the ribbon-controlled means, collars respectively fixed to the upper and lower shaft sections, cooperating stops respectively fixed to the collars and arranged in overlapping relation to limit the rotation of one section relative to the other, and a spring connected to the shaft sections and placed under tension when the ribbon-controlled means is actuated by the ribbon and effective to rotate the spool to take up the ribbon slack simultaneously with the return movement of the ribbon-controlled means to its initial position, said spring being disposed around one shaft section and between the collars on the sections and within the path of movement of the cooperating stops.

7. In a typewriter or the like, a ribbon feeding mechanism including a ribbon spool, a ribbon wound thereon, and a spool shaft comprising upper and lower sections supported for relative rotary movements, the spool being connected to the upper section to rotate therewith, a ribbon reversing mechanism, a movable ribbon-controlled means for operating said reversing mechanism, means for returning the ribbon-controlled means to its initial position immediately following the operation of the reversing mechanism whereby a slack in the ribbon is formed between the spool and the ribbon-controlled means, a spring interposed between and connected to the upper and lower shaft sections and placed under tension when the ribbon-controlled means is actuated by the ribbon and effective to rotate the spool to take up the ribbon slack simultaneously with the return movement of the ribbon-controlled means to its initial position, and means for retaining the lower shaft section against rotation during the tensioning of said spring.

8. In a typewriter or the like, a ribbon feeding mechanism including a ribbon spool, a ribbon wound thereon, and a spool shaft comprising upper and lower sections supported for relative rotary movements, the spool being connected to the upper section to rotate therewith, a ribbon reversing mechanism, a movable ribbon-controlled means for operating said reversing mechanism, means for returning the ribbon-controlled means to its initial position immediately following the operation of the reversing mechanism whereby a slack in the ribbon is formed between the spool and the ribbon-controlled means, a spring interposed between and connected to the upper and lower shaft sections and placed under tension when the ribbon-controlled means is actuated by the ribbon and effective to rotate the spool to take up the ribbon slack simultaneously with the return movement of the ribbon-controlled means to its initial position, and means for retaining the lower shaft section against rotation during the tensioning of said spring and releasable by the ribbon-controlled means during the return movement of the latter.

9. In a typewriter or the like, a ribbon feeding mechanism including a ribbon spool, a ribbon wound thereon, and a spool shaft comprising upper and lower sections supported for relative rotary movements, the spool being connected to the upper section to rotate therewith, a ribbon reversing mechanism, a movable ribbon-controlled means for operating said reversing mechanism, means for returning the ribbon controlled means to its initial position immediately following

the operation of the reversing mechanism whereby a slack in the ribbon is formed between the spool and the ribbon-controlled means, a spring interposed between and connected to the upper and lower shaft sections and placed under tension when the ribbon-controlled means is actuated by the ribbon and effective to rotate the spool to take up the ribbon slack simultaneously with the return movement of the ribbon-controlled means to its initial position, and means operated by the ribbon-controlled means during movement thereof by the ribbon to lock the lower shaft section against movement during rotation of the upper shaft section against the tension of said spring and to release said lower shaft section during the return movement of said ribbon-controlled means.

10. In a typewriter or the like, a ribbon feeding mechanism including a ribbon spool, a ribbon wound thereon, and a spool shaft comprising upper and lower sections supported for relative rotary movements, the spool being connected to the upper section to rotate therewith, a ribbon reversing mechanism, a movable ribbon-controlled means for operating said reversing mechanism, means for returning the ribbon-controlled means to its initial position immediately following the operation of the reversing mechanism whereby a slack in the ribbon is formed between the spool and the ribbon-controlled means, a spring interposed between and connected to the upper and lower shaft sections and placed under tension when the ribbon-controlled means is actuated by the ribbon and effective to rotate the spool to take up the ribbon slack simultaneously with the return movement of the ribbon-controlled means to its initial position, a circular rack fixed to the lower shaft section, and a latch operated by the ribbon-controlled means during movement thereof by the ribbon to engage the rack and lock the lower shaft section against movement during rotation of the upper shaft section against the tension of said spring and to release said lower shaft section during the return movement of said ribbon-controlled means.

11. In a typewriter or the like, a ribbon feeding mechanism including a ribbon spool, a ribbon wound thereon, and a spool shaft comprising upper and lower sections supported for relative rotary movements, the spool being connected to the upper section to rotate therewith, a ribbon reversing mechanism, a movable ribbon-controlled means for operating said reversing mechanism including a bell crank lever, means for returning the ribbon-controlled means to its initial position immediately following the operation of the reversing mechanism whereby a slack in the ribbon is formed between the spool and the ribbon-controlled means, and a spring interposed between and connected to the upper and lower shaft sections and placed under tension when the ribbon-controlled means is actuated by the ribbon and effective to rotate the spool to take up the ribbon slack simultaneously with the return movement of the ribbon-controlled means to its initial position, a circular rack fixed to the lower shaft section and a latch arm fixed to said bell crank lever and movable by the ribbon-controlled means to engage the rack and lock the lower shaft section against movement during rotation of the upper shaft section against the tension of said spring and to release said lower shaft section during the return movement of said ribbon-controlled means.

In testimony whereof, I have hereunto subscribed my name.

GEORGE F. HANDLEY.