April 17, 1934. C. H. THORNBLADE 1,955,372

RIBBON FEED MEANS FOR COPYWRITERS

Filed Jan. 16, 1931 4 Sheets-Sheet 1

FIG. 1

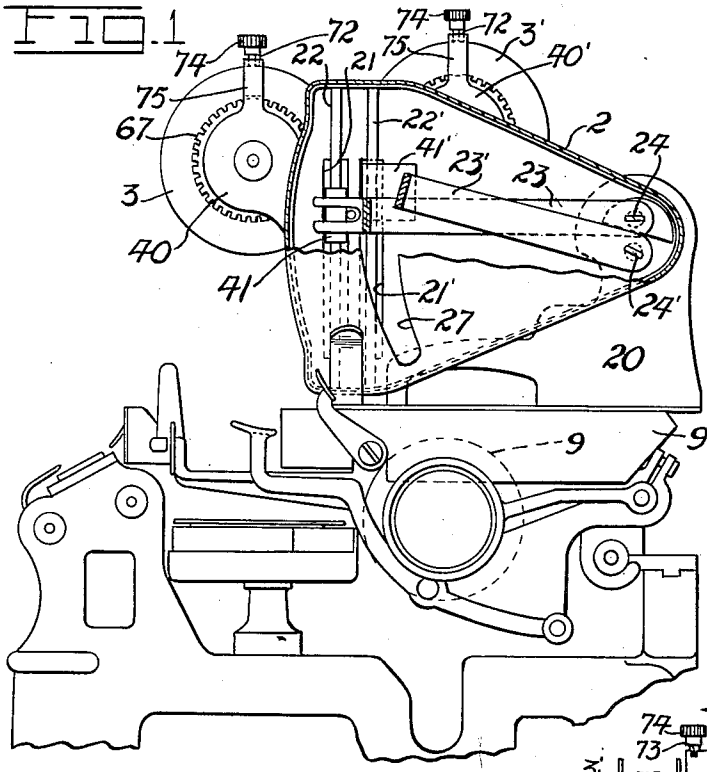


FIG. 5

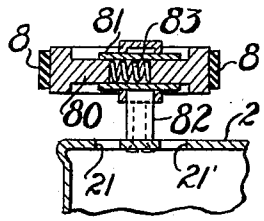


FIG. 6

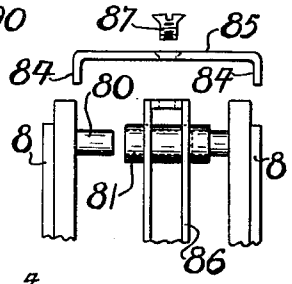


FIG. 4

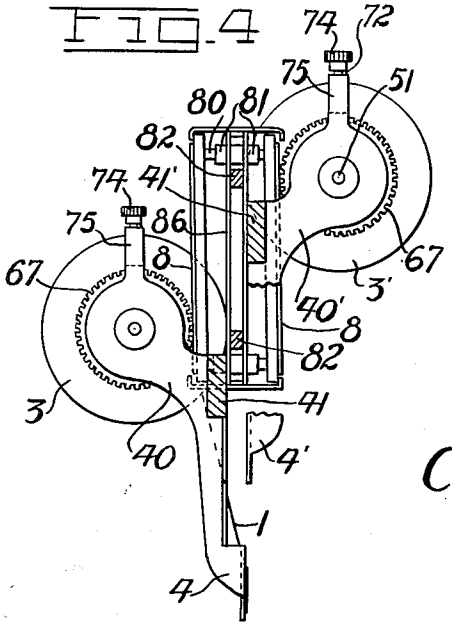
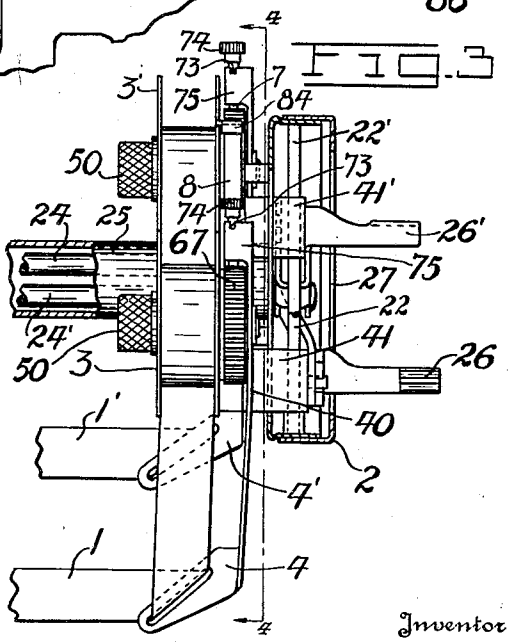


FIG. 3



Inventor

Carl Hugo Thornblade

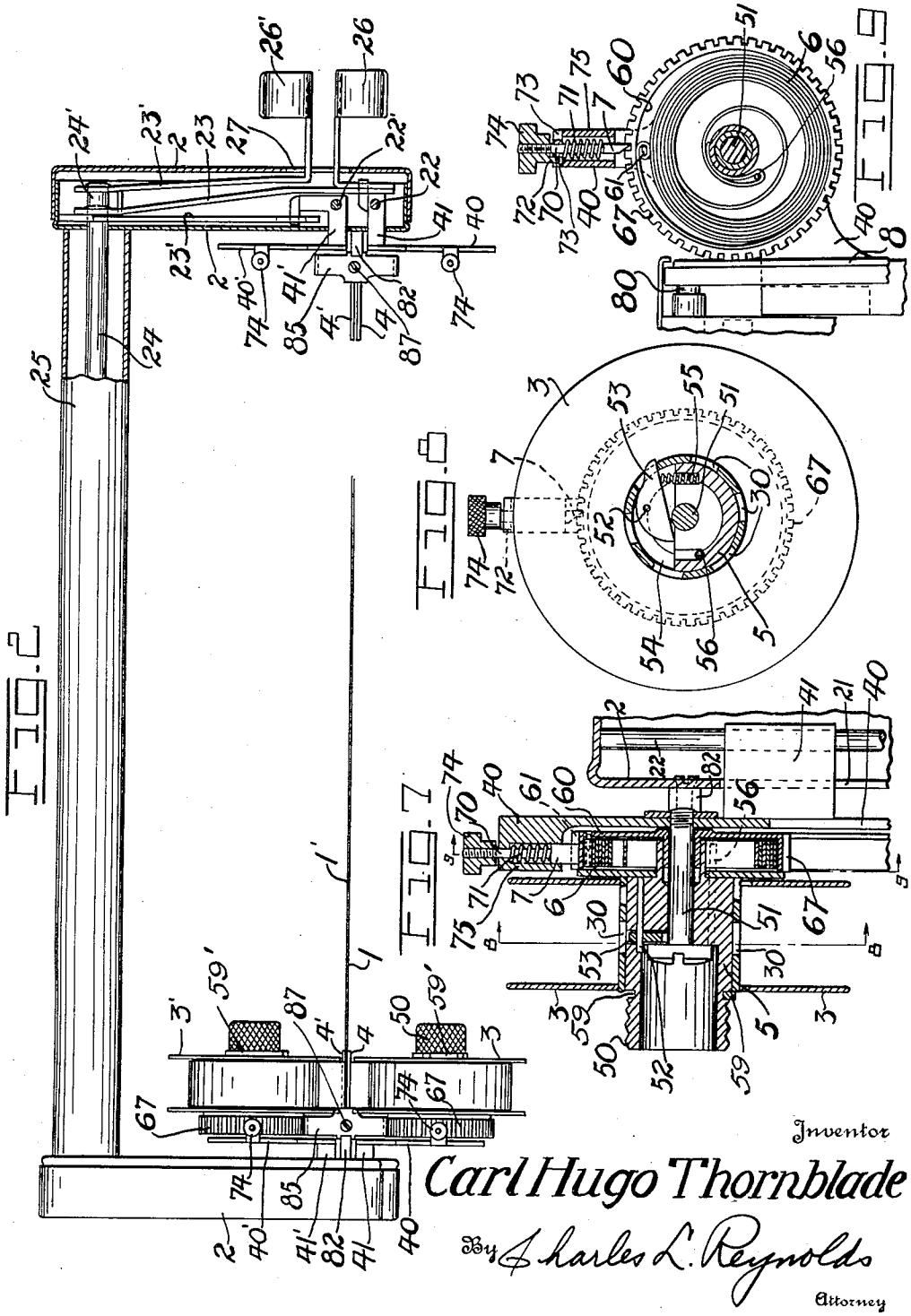
By Charles L. Reynolds

Attorney

April 17, 1934. C. H. THORNBLADE 1,955,372

RIBBON FEED MEANS FOR COPYWRITERS

Filed Jan. 16, 1931 4 Sheets-Sheet 2



Inventor

Carl Hugo Thornblade

By Charles L. Reynolds

Attorney

April 17, 1934. C. H. THORNBLADE 1,955,372

RIBBON FEED MEANS FOR COPYWRITERS

Filed Jan. 16, 1931 4 Sheets-Sheet 3

FIG. 10

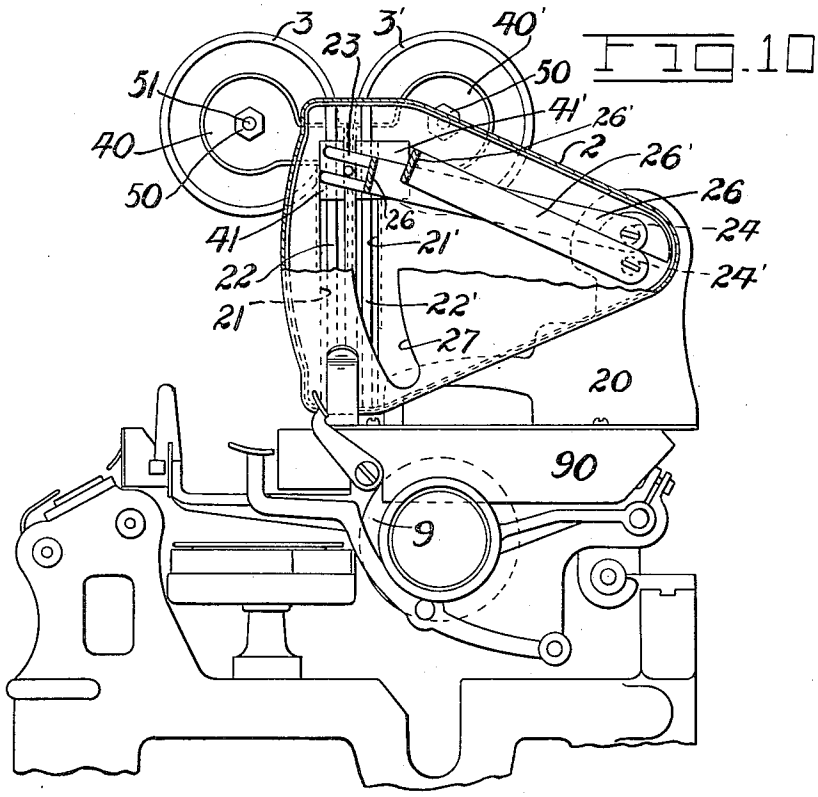
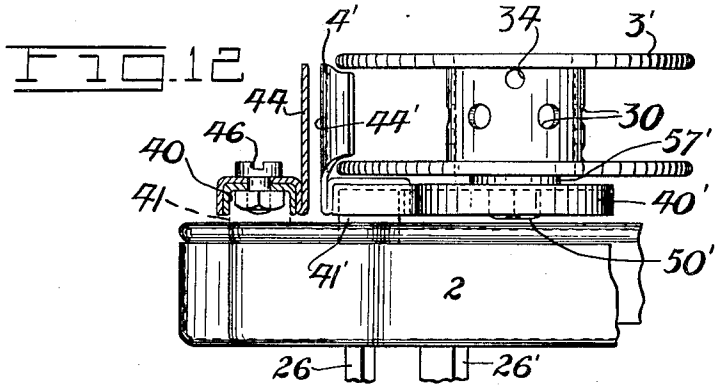


FIG. 12



Inventor

Carl Hugo Thornblade

By Charles L. Reynolds

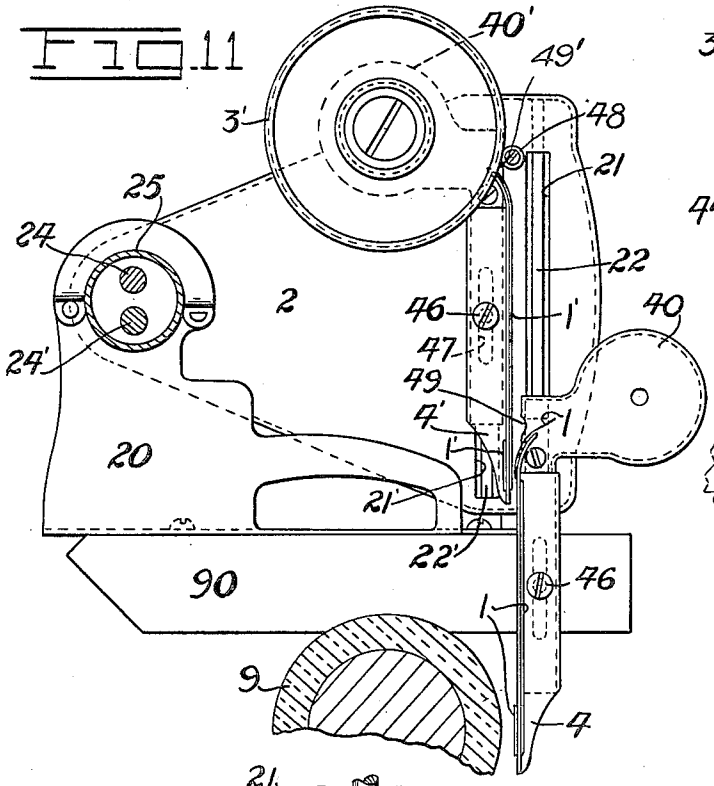
Attorney

April 17, 1934. C. H. THORNBLADE 1,955,372

RIBBON FEED MEANS FOR COPYWRITERS

Filed Jan. 16, 1931 4 Sheets-Sheet 4

FIG. 11



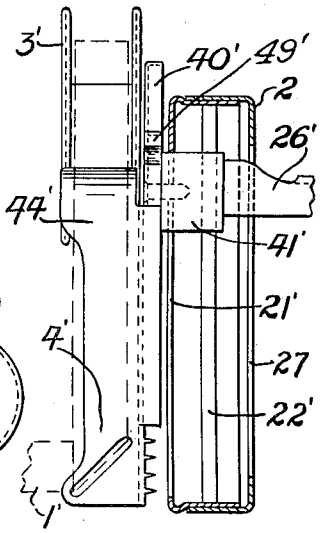


FIG. 13

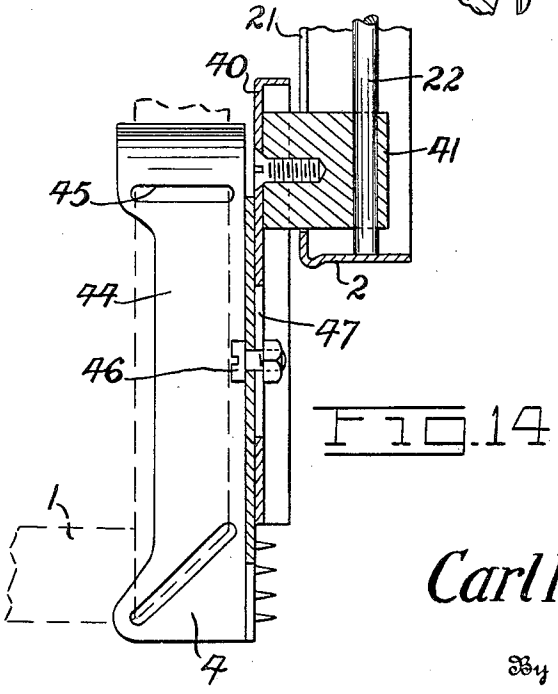
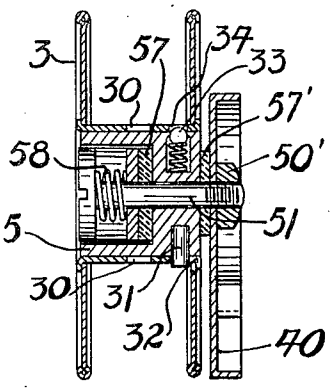


FIG. 14

FIG. 15



Inventor

Carl Hugo Thornblade

By Charles L. Reynolds

Attorney

Patented Apr. 17, 1934 1,955,372

UNITED STATES PATENT OFFICE

1,955,372

RIBBON FEED MEANS FOR COPYWRITERS

Carl Hugo Thornblade, Seattle, Wash., assignor to Original Copywriter Company, Seattle, Wash., a corporation of Washington

Application January 16, 1931, Serial No. 509,123

24 Claims. (Cl. 197—153)

My invention relates to devices for making multiple copies of matter which is being typed upon a typewriter, which such devices I designate as copywriters, and involve the employment of one or more ribbons in addition to the ribbon of the typewriter itself, which ribbons are stretched across the face of the platen and are interposed between copies behind the original copy so that the additional copies are typed simultaneously with the typing of the original or outer copy.

My present invention is an improvement upon my former application, Serial No. 401,202, filed October 21, 1929. The present invention is particularly directed (1) to a means for feeding or advancing the ribbon or ribbons automatically, or at will; (2) to a means whereby the ribbons may be moved to and from their operative position without in any way affecting their tension; (3) to a simplified ribbon spool for use in various forms of copywriter.

It is one particular object of my present invention to provide means whereby a ribbon may be advanced by a movement which is required or which may be employed from time to time during the progress of the typing, so that it may be advanced from one spool to another, and to provide means in association with such feed devices whereby the direction of feed may be reversed at will.

It is another especial object to provide a mounting for the ribbon spools whereby they may move as the ribbon is raised from operative position, or dropped back again, without relative movement between the spools and ribbon guides, so that the ribbon tension is in no wise affected.

Further objects are: To provide a mechanism of the character indicated, which will be simple; in which parts are easily assembled; from which the ribbon-carrying spools may be easily and quickly removed and replaced; which employs spools that may be made up cheaply in quantities and differing but slightly from spools ordinarily in use for typewriter ribbons; which permits the easy removal and replacement of parts likely to wear; and which mechanism is in all respects simple, inexpensive, not likely to get out of order, and convenient for the operator.

My invention comprises the novel parts and the novel combination thereof, as shown in the accompanying drawings, described in the specification, and as will be more particularly defined by the claims which terminate the same.

In the accompanying drawings I have shown my invention embodied in a typical form, though it will be understood that various changes may be made within the scope of the appended claims.

Figure 1 is an end elevation of my device applied to a standard typewriter carriage, with parts of my device broken away for better illustration.

Figure 2 is a plan view of my attachment, with parts omitted and others broken away.

Figure 3 is a front elevation of one end of my device, with parts shown in section, and Figure 4 is a section on the line 4—4 of Figure 3.

Figure 5 is a detail section on a horizontal plane through the friction shoes forming part of my device.

Figure 6 is an exploded view of the upper end of the friction shoe mounting.

Figure 7 is an axial section through one of the spools and associated parts, and Figures 8 and 9 are, respectively, sections on the lines 8—8 and 9—9 of Figure 7.

Figure 10 is an end elevation similar to Figure 1, of a modified and simplified form, and Figure 11 is an elevation of like parts from the opposite side.

Figure 12 is a top plan view of a spool, its bracket and mounting, parts being in section, and Figures 13 and 14 are front elevations of like parts in different positions, further elements being in section.

Figure 15 is an axial section through a spool, and its bracket and spindle, of the form shown in Figures 8 to 12, inclusive.

According to the present invention, a series of ribbons, represented at 1 and 1', are suitably supported and guided, as by the guide 4, in position across the printing face of the platen 9 of a typewriter, and these ribbons are carried upon spools 3, indirectly mounted upon the travelling carriage 90 of the typewriter. It will, of course, be understood that, while I speak of the typewriter parts, my invention is equally applicable to billing machines and other devices whereby matter may be typed upon a sheet of paper, and I do not desire to be understood as limiting myself to the use of the invention upon typewriters only, though it is upon such machines that it appears to have the greatest field of usefulness.

As in my former application, the spools 3 are arranged in pairs, one spool of each pair being mounted at each end of the carriage 90. The opposite ends of the ribbons are wound upon their respective pairs of spools, and I prefer that the ribbon guide means 4 be so mounted, as for instance, upon a casing 2 pivotally supported upon an auxiliary frame 20 secured upon the carriage, in such manner that the ribbons may be moved

into and from operative position, as for instance, by movement from operative position upward into an inoperative position.

It will be recognized that several spools may be mounted at one end of the carriage 90, and for purposes of illustration I have shown two such spools. Solely for the purpose of distinguishing one spool from another, the forward spool may be desibnated 3 and the rear spool 3' (see Figures 3 and 4). Upon them are wound one end of the respective ribbons 1 and 1'. In order to obtain the movement of the ribbons from operative to inoperative position, as heretofore mentioned, each spool is mounted, by means to be described hereafter, upon a bracket 40 or 40' forming the immediate support for the respective spools, and also having an extension forming the guides 4 and 4'. These brackets have secured to each of them a block 41 or 41', which extends through a slot 21 or 21' provided therefor in the casing 2, where the blocks are received and guided about the respective upright posts 22 and 22' held within the casing 2. These blocks are moved vertically, and of course the respective brackets 40 and 40' move with them, by means of the respective arms 23 and 23' secured upon the respective rods 24 and 24', whereby like arms 23 and 23' at opposite ends of the carriage may be connected together. These rods 24 and 24' are pivoted in the casing 2 and may be protected by a tube 25 (see Figure 2), through which they extend, which tube connects the casings 2 at opposite ends of the carriage, and which also serves as a means whereby the casing 2 may be pivoted relative to the base 20 and the entire device be thrown back out of operative position, as is disclosed in my application referred to above. To move the arms 23 and 23' the levers 26 and 26' may be employed, having their ends extending through a slot 27 in the casing 2.

Thus far my device does not essentially differ from the structure of my former case, identified above. The construction of the spool and the ribbon take-up means associated therewith, and the means which I will proceed to describe for semi-automatically advancing the ribbons, is different from that case, however.

It is desirable that the spool be constructed in a simple manner, so that it may be cheaply made and can be supplied with the ribbon and thrown away when the ribbon is exhausted. To that end, I prefer that the spool 3 be formed as an ordinary spool having two flanges secured upon the end of a central drum portion, as may be seen in Figure 7. For a purpose to appear later, the drum portion is provided with a plurality of apertures 30.

Such a spool is received upon a spindle 5 terminating in a knurled end 50, this spindle being rotatable about a bolt 51 which holds it to the bracket 40, or 40' as the case may be. In order to hold the spool upon the spindle, a circumferential groove 59 may be provided in the end 50 into which a spring clip 59' may be received of sufficient size to overlap and engage the spool 3 (see Figures 2 and 7).

Disposed about one end of the spindle 5, and preferably journaled to rotate thereabout, is a spring case 60, within which is received a spiral spring 6. One end of this spring is adapted to be engaged with a pin 56 projecting from the spindle 5, and its other end is adapted to be secured to a pin 61 in the spring case 60. By these, or like means, any tension in the spring 6 will cause a tendency for the spindle 5 to rotate, if the spring case is held against rotation, and if the spool 3 is suitably held to the spindle 5, it will cause a tendency for the spool 3 to rotate with its spindle. A frictional means may be provided to engage the end of the spring 6 so that when excessive tension is applied to it the spring will not tend to break.

As a means of securing the spool 3 to the spindle 5 to cause rotation of the spool from the spindle, I may provide the ratchet dog 53 pivoted upon a small pin 52 in the spindle and received in a transverse slot 54 in the spindle, this dog 53 being projectable under the influence of a small spring 55 to engage in the aperture 30 of the drum portion of the spool 3. By such means the tendency of the spindle 5 to rotate in one direction will be communicated through this ratchet dog 53 to rotate the spool, while any force applied to the spool tending to rotate it in the opposite direction will permit it to overrun the spindle 5 without danger of breaking the spring 6.

As a means of holding the spring case 60 against rotation, so as to produce a tendency for the spindle 5 to rotate when the spring 6 is tensioned, I may provide teeth 67 upon the outside of the spring case 60, and to engage these teeth I provide a reversible ratchet dog 7. This dog is carried upon a pin 70 reciprocably mounted in the bracket 40 and urged downward by a spring 71. By drawing the pin 70 upward, the lug 72 upon the head 74 of the pin, may be withdrawn from one of two notches 73 in the sleeve 75 which receives the pin 70 and spring 71, and the dog 7 may be released from the teeth 67 and may be turned around so as to ratchet in the opposite direction, with the lug 72 in the other notch 73, thus permitting rotation of the spring case 60 under the influence of rotation of the spindle 5. The tendency to rotate the spindle may be communicated thereto by means of tension applied to the ribbon upon the spool 3, which is wound off of this particular spool and upon the corresponding spool of the pair at the opposite end of the carriage.

It will now be seen that, with the ratchet dog 7 arranged in one position the spring case 60 may be acted upon by an external device causing it to rotate and thereby to tension the spring 6. This tendency is communicated from the spring to the spindle 5, and thence to the spool 3, and ribbon is wound upon this spool. With the ratchet dog 7 reversed, the spring case 60 is permitted to rotate only in a direction which tends to release the tension of the spring 6 within this case, and this tends to cause reverse rotation of the spindle 5 and spool 3, this tendency being equal to the tendency to wind off the ribbon from this spool and to wind it on the other spool of the pair, which, at the same time, is having its spring tensioned.

To rotate the spring cases 60 various means may be employed. Connections might be made to the shift lever of the typewriter carriage 90, or to various other working parts of the typewriter, so as to cause a tendency for the spring cases to rotate at all times, or whenever a shift is made in the controlling typewriter parts. However, since it is necessary from time to time to raise the ribbons 1 and 1' from their operative position in order to insert fresh paper, or the like, or, if typing upon continuous forms arranged in rolls, it is an easy matter to shift the ribbons from time to time, I prefer, and have shown herein, a means for causing a tendency to rotate the spring cases 60, which is attached to and operable

from the means to shift the ribbons and their guides 4 from operative to inoperative position and back again. Such means, it will be remembered, are controlled from the levers 26 and 26'.

To this end, I support adjacent the path of reciprocation of the bracket 40 and spring case 60 a shoe 8 of frictional material. Preferably, it is yieldingly supported, and I have shown pins 80 projecting rearwardly from each shoe (see Figures 5 and 6), received in sleeves 81 which are supported by spacers 82 from the case 2, and springs 83, received in these sleeves 81, serve to project the pins 80 and their shoes 8. One such spring 83 may serve to project two of the pins 80. The shoes 8 may be retained by the downwardly turned angles 84 of a clip 85, which is secured to the ends of a frame supported from the spacers 82 by the screw 87. These flanges 84 restrain the shoes 8, but do not limit their inward movement.

When it is desirable or necessary to shift the ribbons and to advance them from one spool to another, and in any event, whenever the ribbons are moved into inoperative position, the levers 26 and 26' are thrown upward and the spring cases 60 all move upward in contact with their respective shoes 8. Those that are not prevented by their ratchet dogs 7 from rotating will rotate on this upward movement, and those that did not rotate on the upward movement will rotate or tend to rotate on the downward movement back into the operative position. The result will be that the cases 60 will tend to rotate in a manner to tension the springs 6 of such as are winding ribbon onto the associated spools, while those that are winding off the ribbon will not rotate, but their spring cases 60 will merely move across the corresponding shoe 8 without result, but the spool will be rotated by the tension applied through the ribbon wound thereupon and passing to the spool at the opposite end, which is advanced, and in which the spring is tensioned to wind on the ribbon. Thus, a regular advance of the ribbon, by an amount governed by the diameter of the spring case 60 and the length of the corresponding shoe 8 is accomplished. It is automatic in the sense that it is required from time to time in order to enable insertion of the ribbons between the papers which are being typed, but it may also be done at will, from time to time, should it be found necessary or desirable to increase the rate of advance of the ribbon.

In Figures 10 to 15 inclusive, I have shown a simpler form of mounting for the spools, which may be employed when it is not desired to provide an automatic feed for the ribbons.

Heretofore the ribbon guide, as 4 or 4', has always been movable relative to the spools, and therefore it has been necessary to provide positively acting ribbon take-up means in the spools, so that when the ribbons were drawn up out of operative position, and returned again to such position, the tension in the ribbon would not be altered; but according to the present invention, as illustrated in Figures 10 to 15 inclusive, the ribbons may be tensioned even by frictional means, and this tension maintained unchanged, even when the ribbons are shifted vertically from and into operative position. To this end, the bracket 40, which carries the spool, is supported from the same support as the ribbon guide 4, and the ribbon guide and the spools move alike with this support. Thus the ribbon guide extends upward, as seen at 44, and may be provided with a slot 45, through which the ribbon passes at its upper end, and thence about a spool which is supported upon the bracket 40. This bracket, as has been mentioned, is supported upon the block 41, and the ribbon guide 4 may be supported in turn from the bracket 40, as by the clamping screw 46. A slot 47, in which the clamping screw 46 moves, will serve to permit adjustment of the ribbon guide so that the ribbon may be positioned in exact registry with the printing face of the platen. A resilient member, as a rubber ring 48, is positioned upon the case 2, to engage in notches 49 and 49' (see Figures 11 and 13), to hold the brackets 40 and 40' and associated parts upraised, when necessary. These several parts may be so formed of sheet metal, pressed into shape, that they will be strong and rigid, yet light, as may be seen in Figure 12.

The construction of the spindle 5 may likewise be altered somewhat to provide a friction means for retaining tension in the ribbons, and to this end, the spindle 51, which is secured as before in the bracket 40, as by a nut 50', has interposed between its head and a friction washer 57 a spring 58, which causes friction between the spindle 5 and the supporting bolt 51, and between the spindle and the bracket 40 there is interposed a second friction washer 57' to create a further frictional grip tending to maintain the spindle 5 in the position in which it is adjusted.

In this form the spool 3 may be secured to the spindle by means of a pin 31 projecting from the spindle 5 and received in a slot 32 in the end and drum portion of the spindle. To hold parts together a spring ball catch 33 may be employed opposite the pin 31, as may be seen in Figure 15, this engaging within a hole 34 provided at the proper place in the drum of the spool. Opposite ends of the spool may be similarly arranged, so that the spool may be put on from either side.

The spool can be made up with the holes 30 and the holes 32 and 33, so that the same spools may be adapted to either form of the copywriter. As thus made up it is inexpensive, and the spools may be thrown away when the ribbon is worn out.

The form just described tensions the ribbon by frictional means, but this may be adjusted at will by loosening the nut 50', and the ribbon can be set forward at will against the frictional tension by advancing the spools at opposite ends of a given ribbon, one in one direction and one in the opposite direction, as in my case heretofore referred to.

What I claim as my invention is:

1. A copywriter attachment for typewriting machines comprising a pair of spools and means for supporting them at opposite ends of the typewriter carriage, a ribbon wound upon and extending between the spools of the pair, ratchet means adapted to restrain rotation of the spools to permit advance of the ribbon in a given direction, means for taking up slack in the ribbon, a member associated with each spool and tending to rotate the same upon relative movement between such member and its spool, and means for causing relative movement therebetween, to advance the ribbon.

2. A device as in claim 1, the ribbon take-up means being incorporated within each spool, and opposing each other, and the ratchet means being reversible to permit movement of the ribbon at will in either direction.

3. A copywriter attachment for typewriting machines comprising a pair of spools and drive means associated therewith, and means for supporting them at opposite ends of the typewriter carriage for bodily movement rela-

tive thereto, means for moving the spools bodily relative to the carriage, a ribbon wound upon and extending between the spools of the pair, reversible ratchet means adapted to restrain rotation of the spools to permit advance of the ribbon in a given direction, means continuously operable to take up slack in the ribbon, a shoe disposed to contact with each spool's driving means as it moves bodily relative to the carriage, and tending to rotate the same in one direction upon movement of the spool from its initial position, and in the opposite direction upon return movement of the spool, the setting of the ratchet means determining the direction of rotation.

4. A device as in claim 3, the ribbon take-up means including a spring associated with each spool, and tending to turn it in the direction opposite to the other spool, and the ratchet means being normally set to permit rotation only in the direction to increase the tension of the spring associated with the wind-on spool, and to release the tension of the wind-off spool to tension the ribbon.

5. A device as in claim 3, and means for yieldingly holding the shoe against the spool's driving means in all positions.

6. In combination with a typewriter carriage and platen, two spools supported one at each end of said typewriter carriage, a ribbon having one end wound upon each spool, continuously operable ribbon take-up means associated with each of said spools, means associated with each spool and operable at will to rotate either spool to advance the ribbon, and ribbon guide means operable to position the ribbon, between spools, in advance of the typewriter platen.

7. In combination with a typewriter carriage and platen, two spools supported one at each end of said typewriter carriage, a ribbon having one end wound upon each spool, continuously operable ribbon take-up means associated with each of said spools, ribbon guide means operable to position the ribbon, between spools, in advance of the typewriter platen, means for moving said ribbon at will into inoperative position, and means operable by such movement and by the return movement into operative position to advance the ribbon from one spool to the other.

8. In combination, a plurality of spools, two or more supported at each end of a typewriter carriage, ribbons connecting spools at opposite ends in pairs, a yieldable, continuously operable ribbon take-up means associated with each of said spools, ribbon guide means operable to position the several ribbons, between their supporting spools, in advance of the printing point, means for moving a selected ribbon, or ribbons, at will, from such operative position, and means automatically operable by such movement from operative position, and by the return movement to operative position, to advance each ribbon.

9. In combination with a typwriter platen and a printing ribbon, means for guiding said ribbon for movement across the printing point, storage means for the two ends of the ribbon, means for raising and lowering the ribbon to maintain it at will in or out of registry with the printing point, means for taking up slack in said ribbon at all times, and means operable by movement of the ribbon raising and lowering means for feeding said ribbon to advance it across the printing point.

10. A device for use in combination with a typewriter platen and a carriage supporting the same and movable transversely relative to a fixed printing point, comprising a printing ribbon, guide means to position said ribbon in operative position across the printing face of the platen, storage means upon the carriage for an end of said ribbon, means for taking up slack in said ribbon at all times, a lever controlling movement of the ribbon, and means operable upon movement of said lever to advance the ribbon across the printing face of the platen.

11. A ribbon storage spool for a copywriter ribbon comprising a drum and two spaced flanges thereon, a spindle providing a mounting for said drum, a spring case supported upon said spindle, a spiral spring therein connected at one end to the spring case and at the other end to the spindle to rotate the spindle upon rotation of the spring case, and a support upon which said spindle is rotatably supported.

12. In combination, a spindle, a spring case disposed at one end of the spindle, a spiral spring in said case and secured at one end to the case and at its other end to the spindle, a mounting upon which said spindle may rotate, a flanged spool received upon said spindle, and ratchet means preventing rotation of the spool relative to the spindle when the spring case is rotated in the direction to tension the spring.

13. In combination, a spindle, a spring case disposed at one end of the spindle, a spiral spring in said case and secured at one end to the case and at its other end to the spindle, a mounting upon which said spindle may rotate, a flanged spool received upon said spindle, ratchet means preventing rotation of the spool relative to the spindle when the spring case is rotated in the direction to tension the spring, means supporting the spindle for traversing movement of such spindle and the associated parts mounted thereon, and means disposed adjacent the path of movement of the parts, engageable with the spring case, to rotate it.

14. In combination, a spindle, a spring case disposed at one end of the spindle, a spiral spring in said case and secured at one end to the case and at its other end to the spindle, a mounting upon which said spindle may rotate, a flanged spool received upon said spindle, ratchet means preventing rotation of the spool relative to the spindle when the spring case is rotated in the direction to tension the spring, a bracket supporting the spindle and guided for reciprocatory movement, a yieldingly supported shoe having a facing of frictional material engageable with the spring case throughout its movement with the spindle and bracket, and reversible ratchet means for determining the direction of rotation of the spring case under the influence of said shoe.

15. In combination, a spindle, a spring case supported to rotate relative to the spindle, a spiral spring secured at one end to said case and at its other end to the spindle, means for rotating the spring case to tension the spring, and a spool received upon the spindle to rotate therewith, and adapted to receive a ribbon to be tensioned by the tendency of the spring to rotate the spindle.

16. In combination, a spindle, a spring case supported to rotate relative to the spindle, a spiral spring secured at one end to the spring case and at its other end to the spindle, means for rotating the spring case to tension the spring, ratchet means adapted to prevent reverse rotation of the spring case, and a spool received upon the spindle to rotate therewith, and adapted to

receive a ribbon to be tensioned by the tendency of the spring to rotate the spindle.

17. In combination, a spindle, a spring case supported to rotate relative to the spindle, a spiral spring secured at one end to the spring case and at its other end to the spindle, means for rotating the spring case to tension the spring, ratchet means adapted to prevent reverse rotation of the spring case, a spool received upon the spindle to rotate therewith, and adapted to receive a ribbon to be tensioned by the tendency of the spring to rotate the spindle, and ratchet means interposed between the spool and the spindle to enable overrunning of the spool relative to the spindle and spring.

18. In combination, a spindle, a spring case supported to rotate relative to the spindle, a spiral spring secured at one end to the spring case and at its other end to the spindle, means supporting the spindle and associated parts for bodily reciprocatory movement, means engageable with the spring case throughout such movement tending to rotate the case in one direction to tension the spring, and in the opposite direction to relieve such tension, ratchet means reversible at will to prevent rotation of the spring case to relieve the spring tension, or to permit it, and a spool received upon the spindle to rotate therewith, and adapted to receive a ribbon to be wound on by the tendency of the spring to rotate the spindle.

19. In combination, a spindle, a spring case supported to rotate relative to the spindle, a spiral spring secured at one end to said case and at its other end to the spindle, means for rotating the spring case to tension the spring, a spool having its bore adapted to fit upon the spindle, the spindle being circumferentially grooved at the outer end of the spool, a spring clip received in said groove to retain the spool upon said spindle, and means interengageable between the spool and spindle to cause rotation of the spool with the spindle.

20. In combination, a spindle, a spring case supported to rotate relative to the spindle, a spiral spring secured at one end to said case and at its other end to the spindle, means for rotating the spring case to tension the spring, a spool having its bore adapted to fit upon the spindle, the spindle being circumferentially grooved at the outer end of the spool, a spring clip received in said groove to retain the spool upon said spindle, the drum portion of the spool having apertures disposed thereabout, and a ratchet dog carried by the spindle and engageable with the apertures of the spool's drum to rotate the spool with the spindle in one direction.

21. In a copywriter attachment for typewriting machines, a pair of spools and a ribbon extending from one spool to the other, a bracket supporting each spool and embodying a ribbon guide, a support for the two brackets, one at each end of the typewriter carriage, and vertical guide means, and means to move each bracket thereon, with its spool and ribbon guide, as a unit, from operative position with the ribbon extending across the writing face of the platen, into an inoperative position, and return.

22. The combination of claim 21, and means to adjust the ribbon guide vertically relative to the bracket.

23. The combination of claim 21, and frictional means associated with the spool's support, and operable by movement of the spool from or into operative position to place the ribbon under tension.

24. The combination of claim 21, and complemental frictional holding means associated with the bracket and the vertical guide means to maintain the ribbon guide and the ribbon held thereby under tension.

CARL H. THORNBLADE.