Dec. 8, 1942. R. G. THOMPSON 2,304,216

TYPEWRITING AND LIKE MACHINES

Filed Sept. 29, 1939 3 Sheets-Sheet 1

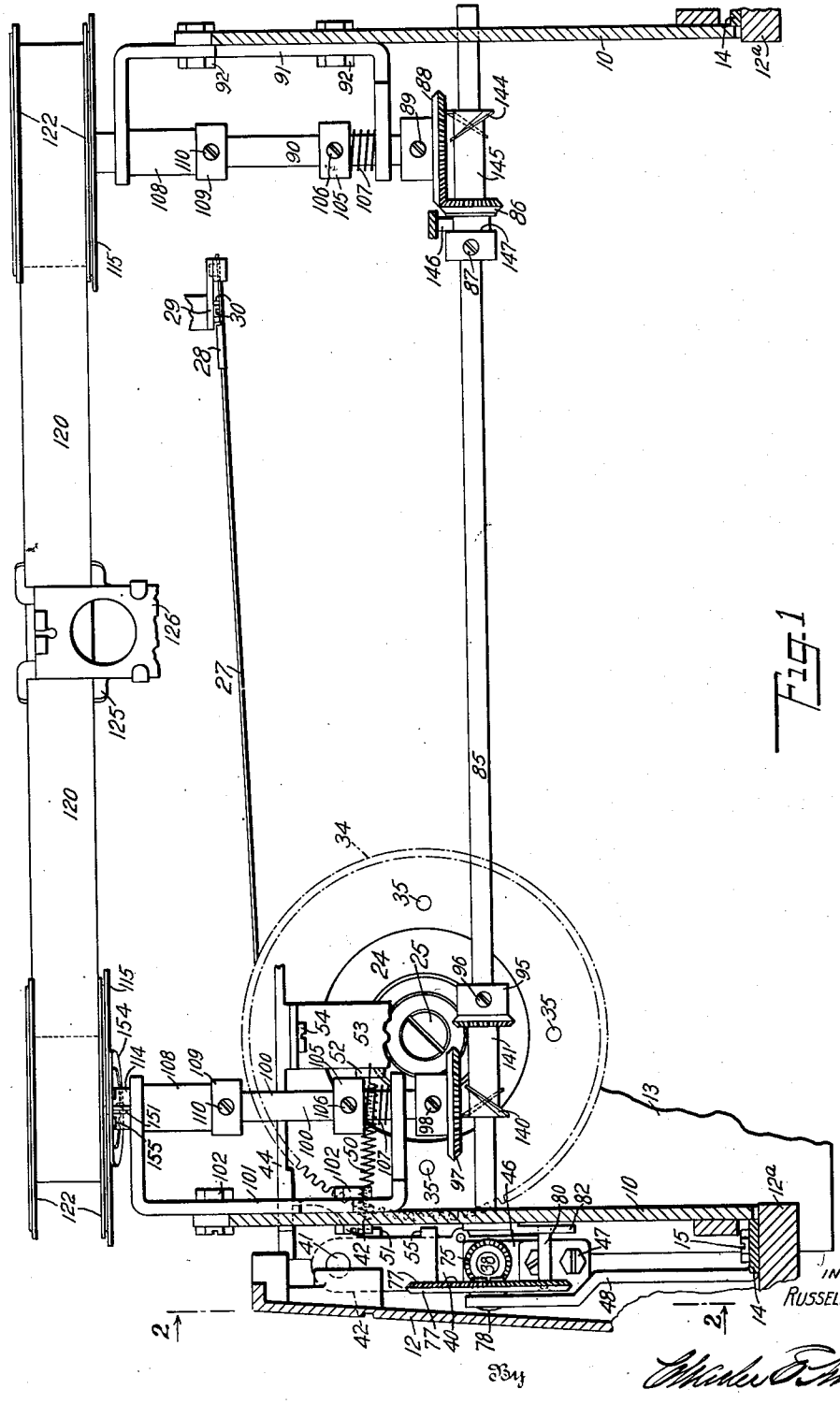


FIG. 1

INVENTOR
RUSSELL G. THOMPSON

By

Attorney

Dec. 8, 1942. R. G. THOMPSON 2,304,216

TYPEWRITING AND LIKE MACHINES

Filed Sept. 29, 1939 3 Sheets-Sheet 2

Fig. 3

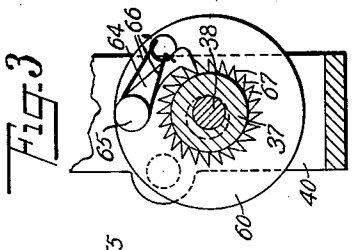


Fig. 4

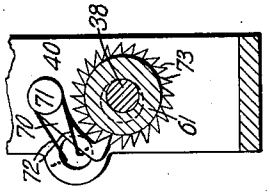
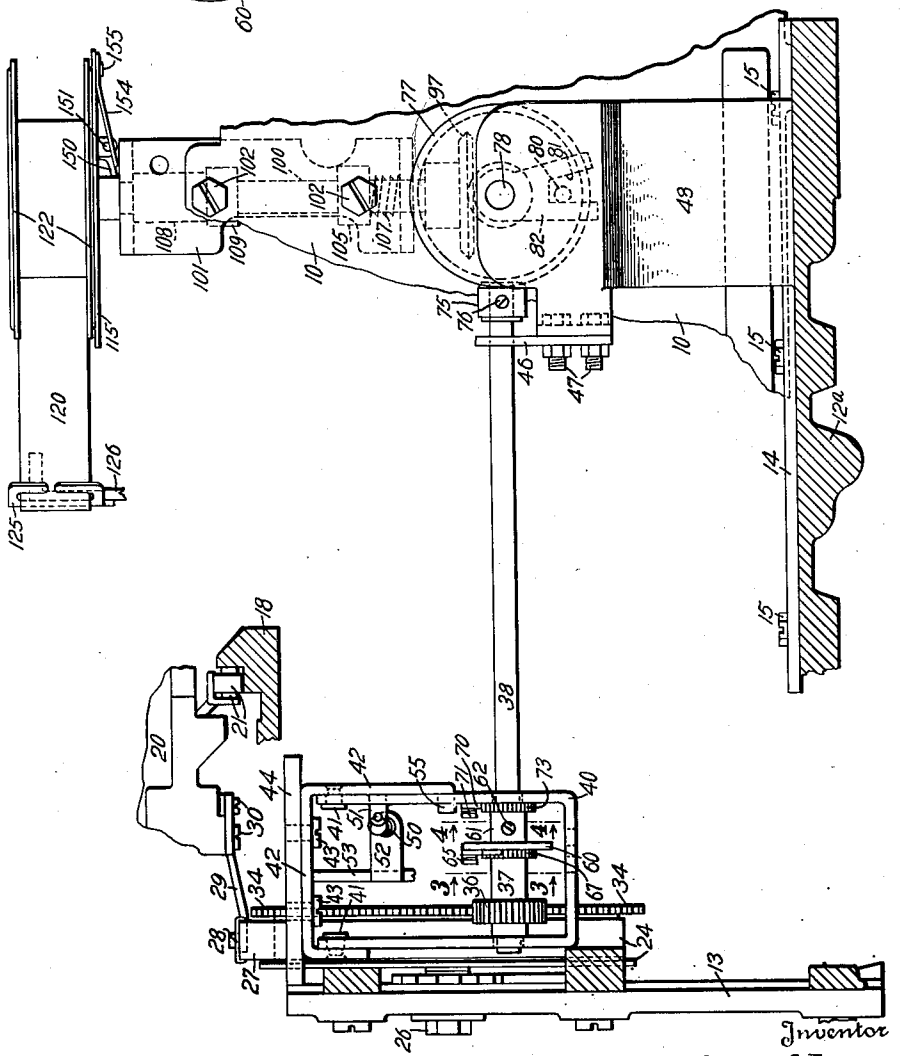


Fig. 2



Inventor
RUSSELL G. THOMPSON

By Charles E. Smith
Attorney

Dec. 8, 1942. R. G. THOMPSON 2,304,216

TYPEWRITING AND LIKE MACHINES

Filed Sept. 29, 1939 3 Sheets-Sheet 3

Fig. 5

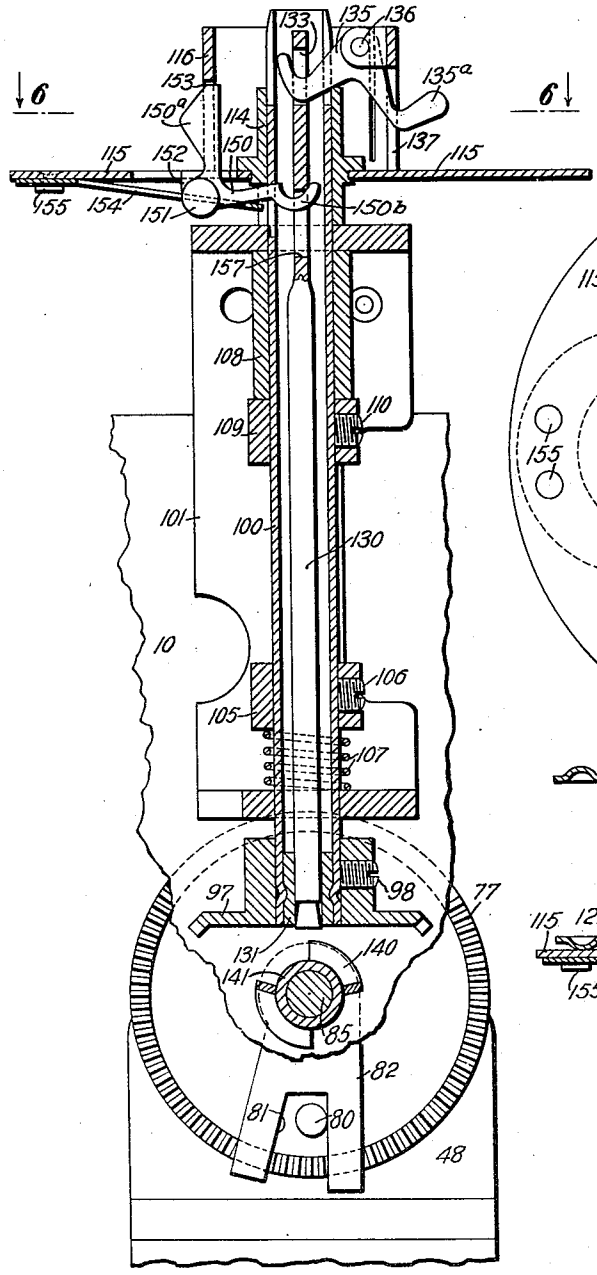
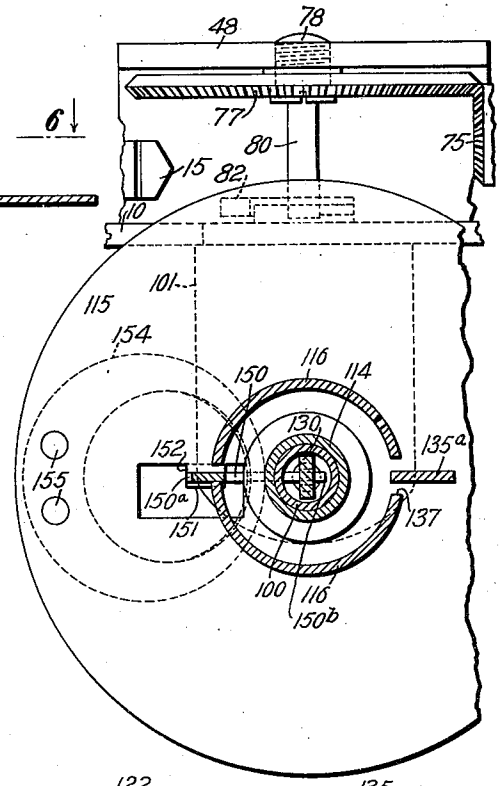


Fig. 6



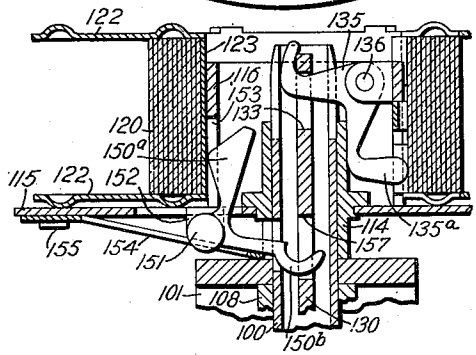


Fig. 7

Inventor
RUSSELL G. THOMPSON

By Charles E. Smith

Attorney

Patented Dec. 8, 1942 2,304,216

UNITED STATES PATENT OFFICE

2,304,216

TYPEWRITING AND LIKE MACHINES

Russell G. Thompson, West Hartford, Conn., assignor to Remington Rand Inc., Buffalo, N. Y., a corporation of Delaware

Application September 29, 1939, Serial No. 297,135

5 Claims. (Cl. 197—160)

My invention relates to typewriting and like machines, and more particularly to improved ribbon feeding mechanism therefor.

The main object of my invention, generally stated, is to provide improved means of the character specified which is simple, reliable and highly effective in operation.

A further object of my invention is to provide a ribbon feeding mechanism wherein the direction of feed of the ribbon is automatically reversed, and wherein provision is made against locking such ribbon reversing mechanism against operation when the machine is operated with the ribbon spools removed as in cutting or typing stencil sheets.

A still further object of my invention is to provide such ribbon feeding mechanism wherein certain parts thereof are carried by an exterior frame or casing and other parts are carried by an interior chassis which may be readily removed from said casing.

To the above and other ends which will hereinafter appear, my invention consists of the features of construction, arrangement of parts and combinations of devices set forth in the following description and particularly pointed out in the appended claims.

In the accompanying drawings, wherein like reference characters indicate corresponding parts in the different views:

Fig. 1 is a vertical, transverse sectional view taken through the central portion of a typewriting machine, and illustrating a sufficient number of parts thereof to show my invention in its embodiment therein.

Fig. 2 is a fragmentary, fore and aft, vertical sectional view taken on line 2—2 of Fig. 1 and viewed in the direction of the arrows at said line.

Fig. 3 is a fragmentary, detail sectional view taken on line 3—3 of Fig. 2 and viewed in the direction of the arrows at said line.

Fig. 4 is another fragmentary, detail sectional view taken on line 4—4 of Fig. 2 and viewed in the direction of the arrows at said line.

Fig. 5 is an enlarged, fragmentary, vertical sectional view of one of the spool shafts and some of the associated parts, the view showing the parts as they appear when the companion ribbon spool is removed.

Fig. 6 is an enlarged, fragmentary, horizontal sectional view taken on line 6—6 of Fig. 5 and viewed in the direction of the arrows at said line.

Fig. 7 is an enlarged, fragmentary, sectional view similar to the upper portion of Fig. 5 but showing certain parts as they appear when the ribbon spool is applied.

I have shown my invention embodied in the present instance in a Remington Model No. 17 typewriting machine in which the features of the invention may be readily incorporated with but few changes in the existing structure. However, it is to be understood that my invention is not restricted to embodiment in such machine but may be employed in various other types of typewriting and like machines wherever found available.

The drawings show only so much of the construction of the Remington Model No. 17 machine as is necessary to arrive at an understanding of the present invention in its embodiment therein. In this machine, many of the parts including the type actions, key levers and various other related mechanism are mounted on a removable chassis formed by side plates 10 which are rigidly connected by cross members which are not shown in the drawings. This chassis is removably mounted within an exterior frame or casing which includes a U-shaped member having side portions 12 which extend along the side plates 10 of the chassis in spaced relation thereto as may be seen in Fig. 1 wherein the left hand side member 12 only of the exterior frame is shown. The removable chassis and associated parts are fully disclosed in my companion application filed July 26, 1940, Serial No. 347,677.

The two side portions 12 of the exterior frame are rigidly inter-connected by suitable cross members such as the rear cross member 13 shown in part in Figs. 1 and 2. The lower edge of each of the chassis side plates 10 rests on companion shelf portions 12a which extend inwardly from the associated side member 12 of the exterior frame. A guide plate 14 is secured at 15 to the upper surface of each of the shelf portions 12a to engage the outside surface of the companion chassis side plates 10 and thereby prevent lateral shifting of the chassis within the exterior frame. Suitable means, not shown, are also provided for holding the chassis frame against vertical displacement within the exterior frame, which means coact between the chassis side plates 10 and the side portion 12 of the exterior frame and are readily releasable to permit the chassis and parts carried thereby to be lifted upwardly and forwardly out of the exterior frame.

The carriage in the present machine is removably mounted on the rear upper portion of the side members 12 of the exterior frame. Thus,

a stationary carriage guide member 18 shown in part in Fig. 2 is removably mounted on the side members 12 of the exterior frame by means which have not been shown, and the traveling carriage frame shown in part at 20 in Fig. 2 is mounted by crossed anti-friction rollers such as 21, on the supporting member 18 for movement transversely of the machine in the usual manner.

The carriage thus mounted for movement transversely of the machine is impelled in a letter spacing direction from right to left by a spring drum 24 which is mounted to turn about the axis of a screw 25 secured by a nut 26 to the rear cross member 13 of the exterior frame. The spring drum 24 includes the usual spiral internal spring (not shown) which exerts a force tending to turn the drum 24 in a counter-clockwise direction as viewed in Fig. 1, and the spring drum 24 is operatively connected to the carriage by a flexible tape 27 which extends around the periphery of the drum. Thus, one end of the tape 27 is anchored to the spring drum while the other end is provided with a connecting piece 28 which is detachably connected to an arm 29 attached at 30 (see Fig. 2) to the right hand end of the carriage frame member 20. The spring drum 24 thus turns in a counter-clockwise direction to move the carriage in a letter spacing direction from right to left of the machine under control of the usual escapement mechanism (not shown), and a return movement of the carriage accordingly effects a reverse or clockwise direction of turning movement of the drum through the tape 27.

The feeding mechanism for the ink ribbon in the present instance is driven by this turning movement of the spring drum 24, and is so arranged that the ribbon is fed intermittently past the printing point as the spring drum is turned in a counter-clockwise direction to impel the carriage in its step by step movement from left to right of the machine for the spacing or written characters. Thus, a ring gear 34 is fixedly secured to the front face of the spring drum 24 in any suitable manner such as by spot welding at 35, which gear 34 normally meshes with a smaller pinion gear 36. The pinion gear 36 is provided with a hub portion 37 which is mounted to turn freely on the rear end portion of a shaft 38. The shaft 38 extends fore and aft of the machine in the space between the left hand chassis side plate 10 and the left hand side portion 12 of the exterior frame as shown in Fig. 1. The rear end portion of the shaft 38 is mounted to turn in a U-shaped member 40 which is pivotally mounted at 41 on a bracket 42 secured at 43 to a horizontal inwardly extending portion 44 on the exterior frame cross member 13. The front end of the shaft 38 is supported by a bearing plate 46 secured at 47 to an upward extension 48 of the guide member 14, (see Fig. 1) which as previously described is secured at 15 to the shelf 12a of the left hand side portion 12 of the exterior frame.

The U-shaped bearing member 40 is acted upon by a contractile spring 50 to normally hold the pinion 36 in mesh with the ring gear 34, which spring 50 extends between a lug 51 extending rearwardly from the bearing member 40 and a lug 52 extending forwardly from a bracket 53 which is secured at 54 (see Fig. 1) to the horizontal extension 44 of the cross member 13 of the exterior frame. The U-shaped bearing member 40 is thus normally held under the force of the spring 50 in engagement with a lug 55 (Figs. 1 and 2) on a downwardly extending portion of the bracket 42, and thereby holds the pinion 36 in proper meshed relation with the ring gear 34. The present invention is not particularly concerned with the mounting of the bearing member 40 for pivotal movement, this mounting being provided for at times rendering the ribbon feeding mechanism inoperative through devices which are disclosed in my copending application filed Nov. 17, 1939, Serial No. 304,988, now Patent No. 2,254,921 issued Sept. 2, 1941.

A one-way driving connection is provided between the hub member 37 of the pinion 36 and the shaft 38 in order that the shaft 38 will be turned only during the letter spacing direction of travel of the carriage. Referring to Figs. 2 and 3, it will be seen that a disc 60 having a hub portion 61 is secured at 62 on the shaft 38. A pawl 64 is pivotally mounted at 65 on the rear surface of the disc 60, and a wire spring 66 presses the free end of the pawl 64 into cooperative relation with ratchet teeth 67 formed on the front end of the hub portion 37 of the pinion 36. It will be seen in Fig. 3 that the teeth 67 are so shaped that when the hub portion 37 of the pinion gear 36 is turned in a counter-clockwise direction as viewed in Fig. 3, the pawl 64 will be driven by the teeth 67 to accordingly turn the shaft 38 during a movement of the carriage from right to left of the machine for the spacing of printed characters. However, when the carriage is moved from left to right, the hub portion 37 of the gear 36 will be turned in a clockwise direction as viewed in Fig. 3 which causes the teeth 67 to cam the free end of the pawl 64 outwardly therefrom and accordingly this direction of rotation of the gear 36 is not transmitted to the shaft 38.

In order to insure that the shaft 38 will not be turned in a clockwise direction during the clockwise turning movement of the gear 36, a holding pawl 70 is pivoted at 71 on the bearing member 40, and a wire spring 72 acts on the pawl 70 to normally hold the free end thereof in cooperative relation to ratchet teeth 73 formed on the forward end portion of the hub member 61 of the disc 60. It will be noted that the teeth 73 are oppositely arranged with respect to the teeth 67 on the hub member 37 so that the hub member 61 and accordingly the shaft 38 is securely held by the engagement of the free end of the pawl 70 with one of the teeth 73 when the hub member 61 tends to turn in a clockwise direction. The teeth 73, however, are effective to cam the free end of the pawl 70 outwardly to an ineffective holding position when the disc 60 is driven in a counter-clockwise direction by the gear 36.

Referring to Figs. 1, 2 and 6, it will be seen that the front end of the shaft 38 is provided with a beveled pinion gear 75 secured thereto at 76 to mesh with a beveled gear wheel 77 mounted to turn freely on a headed pivot screw 78 threaded into the upper end of the extension 48. The parts of the ribbon driving mechanism thus far described are all mounted on and carried by the exterior frame of the machine while the ribbon itself and the remainder of the ribbon feeding mechanism is mounted on and carried by the removable chassis. Accordingly means are provided in accordance with the present invention for operatively connecting the gear wheel 77 with the ribbon feeding mechanism mounted on the removable chassis in a manner which permits the chassis to be readily removed.

This connecting means is provided by a pin 80 secured to the gear wheel 77 to extend inwardly therefrom at a point spaced from the pivot screw

78 as shown in Figs. 1, 2, 5 and 6, which pin normally enters a bifurcation 81 in an arm 82 which is fixedly secured at the extreme left hand end of a shiftable ribbon drive shaft 85. The shaft 85 extends transversely of the machine in axial alignment with the pivot screw 78, and is mounted on and carried by the removable chassis by bearing openings provided in each of the end plates 10. In this manner, the ribbon driving mechanism carried by the external frame is operatively connected to the shaft 85 through the pin 80 and bifurcated arm 82 when the chassis is in its normal position, but the bifurcation 81 in the arm 82 permits the chassis to be lifted upwardly out of the exterior frame and to be readily replaced therein.

A beveled gear 86 is secured at 87 to the right hand portion of the drive shaft 85, and at the position of the parts shown in Fig. 1, said gear 86 meshes with a beveled gear 88 secured at 89 to the lower end portion of a tubular ribbon spool shaft 90. Said shaft 90 is supported in a substantially vertical position at the right hand side of the machine in bearing openings in a U-shaped bracket 91 secured at 92 to the right hand chassis side plate 10. A beveled gear 95 similar to the bevel gear 86 is secured at 96 to the left hand portion of the drive shaft 85, and the shaft 85 may be moved to the left in the direction of its length to move the gear 95 into meshed relation with a beveled gear 97 secured at 98 to the lower end of a left hand ribbon spool shaft 100. The left hand ribbon spool shaft 100 which is shown in detail in Fig. 5 is of a tubular construction substantially the same as the right hand ribbon spool shaft 90, the left hand shaft 100 being rotatively supported in a substantially vertical position by a U-shaped bracket 101 which is secured at 102 to the left hand chassis end plate 10.

Means are provided for affording a slight resistance to the turning of the spool shafts 90 and 100, which means includes a collar 105, secured to each of the spool shafts at 106 and a companion expansion spring 107 arranged between each of the collars 105 and the lower arm of the associated bearing bracket. Thus, each of the springs 107 offers a slight frictional resistance to the turning of the companion spool shaft and acts to resiliently hold it in its upper position wherein a spacing sleeve 108 on each of the spool shafts engages the companion upper arm of the associated bearing bracket, each of the sleeves 108 being retained against displacement on the companion shaft by a collar 109 secured thereto at 110.

The upper end of each of the ribbon spool shafts 90 and 100 is provided with substantially the same means for holding the inking ribbon spool thereon. Thus, as may be seen in Fig. 5, a hub member 114 is fixedly secured in any suitable manner to the portion of the associated shaft which extends above the bearing bracket, and a supporting flange 115 is formed on each of the hub members by a circular plate which is securely attached against the lower surface of a shouldered portion of the associated hub member 114. A guide ring 116 is provided on each of the flanges 115, which guide ring is disposed concentrically around the hub member 114 and secured to the flange 115 by downwardly projecting lugs (not shown) which pass through openings in the companion flange 115 and are expanded against the walls thereof in the usual manner.

An inking ribbon 120 of the usual construction is shown in Fig. 7 as partly wound around a spool mounted on the left hand spool shaft 100, which spool comprises flanges 122 secured in the usual manner to an inner core or ring 123 which fits snugly around the guide sleeve 116 to turn therewith. Referring to Fig. 1, it will be seen that the inking ribbon 120 extends from this spool at the left hand side of the machine through a ribbon vibrator 125 of the usual construction mounted for vertical movement on a type guide 126, and the other end of the inking ribbon is wound around a spool of like construction mounted on the right hand spool shaft 90.

In Fig. 1 of the drawings, the ribbon feeding mechanism is shown in a condition wherein the right hand spool shaft 90 is turned through the engagement of the gears 86 and 88 when the carriage is moved from right to left of the machine for the letter spacing of printed characters. Under this condition, the left hand spool shaft 100 is not driven by the shiftable drive shaft 85 due to the separation of the gear 96 from the gear 97 so that the turning of the spool shaft 90 winds the ribbon 120 on the right hand spool and accordingly unwinds it from the left hand spool, thereby causing the left hand spool shaft 100 to turn against the slight friction provided by associated spring 107.

Means are provided in the present machine for automatically reversing the direction of the feed of the ribbon 120 when the supply thereof on one of the spools is exhausted. Under the condition shown in Fig. 1, this means operates to shift the feed from the spool shaft 90 to the spool shaft 100 by a longitudinal movement of the drive shaft 85. Thus, referring to Fig. 5, it will be understood that a ribbon reversing member or plunger 130 is provided within each of the hollow spool shafts 90 and 100, each of which plungers is mounted for a slight vertical movement in a companion bushing 131 secured to the lower end of the associated spool shaft and having a centrally disposed opening receiving the lower end portion of the companion plunger. The upper end portion of each of the plungers 130 is flattened as shown in Figs. 5 and 7 and an elongated opening 133 in this flattened portion of each plunger receives the hook-shaped end of a companion crank arm 135 pivotally mounted at 136 on an inwardly extending lug of the associated guide sleeve 116. The depending portion of the crank arm 135 is provided with an extending toe portion 135a extending through a vertically disposed slot 137 in the companion guide sleeve 116. Each of the arms 135 and associated arm 135a constitute a bell crank. The hub portion 123 of each of the ribbon spools 122 is provided with a similar slot or opening which registers with the companion opening 137 when a spool is applied over the associated guide ring 116, as shown in Fig. 7. The toe portion 135a of each of the crank arms 135 engages the inner-most layer of the inking ribbon 120 on the associated spool, thereby holding the crank arm 135 in its position shown in Fig. 7 where the hook-shaped end portion thereof engages the upper wall of the opening 133 in the companion plunger 130 to hold it in its elevated or ineffective position shown in Fig. 5.

When the left hand plunger 130 is thus held in its elevated position by the inner layer of ribbon on the companion spool, the lower end of this plunger is disposed above and out of cooperative relation with a spiral web or cam 140 (Fig. 1) formed on an extending hub portion 141 of the gear 95. Under the condition of the ribbon feeding mechanism shown in Fig. 1, the inking ribbon

120 is being wound on the right hand spool and as the supply of this ribbon on the left hand spool becomes exhausted, or as the last layer thereof is partly unwound to uncover the extending toe portion 135a of the crank arm 135, it will be clear that the plunger 130 will move downward by gravity inasmuch as the crank portion 135a will be free to move outward. The lower end portion of the plunger 130 at the left hand side of the machine will then be in a position coacting with the spiral web 140 to cause an axial shift of the drive shaft 85 while it is being turned by a letter spacing movement of the carriage. In other words, the lower end of the left hand plunger 130 in its lowered position is engaged by the side of the spiral web 140 during a turning movement of the drive shaft 85 which causes the spiral web 140 and the shaft 85 to be cammed to the left as viewed in Fig. 1, to a position wherein the gear 95 meshes with the gear 97. This longitudinal movement of the shaft 85 from right to left also causes the gear 86 to become disengaged from the gear 88, and accordingly the direction of feed of the inking ribbon 120 will be reversed so that the ribbon will then be wound on the left hand spool 122 and unwound from the right hand spool. As the first layer of the inking ribbon 120 is wound around the left hand spool, the crank arm 135 will be moved back to its position shown in Fig. 7 thereby raising the left hand plunger 130 back to its normal position wherein the lower end thereof is out of cooperative relation with the spiral web 140.

The plunger 130 which is mounted within the right hand ribbon spool shaft 90 is arranged in a similar manner so that when at least one layer of ribbon still remains on the companion ribbon spool, the extreme lower end of this plunger is disposed above and out of cooperative relation with a spiral web 144 formed on an extending hub portion 145 of the gear 86. However, as the innermost layer of ribbon on the right hand spool is partly unwound, the companion crank arm 135 is allowed to swing outwardly as the toe portion 135a thereof is uncovered. Thus, the plunger 130 within the right hand spool shaft 90 moves downward under the force of gravity so that the lower end thereof cooperates with the spiral web 144 to cause an axial shift of the drive shaft 85. The spiral web 144, however, is oppositely disposed with relation to the left hand spiral web 140, whereby the drive shaft 85 is moved from left to right to re-engage gears 86 and 87 and to disengage gears 95 and 97 when the right hand plunger 130 thus falls to its lower or operative position. Thus, when the supply of ribbon on either one of the two spools becomes exhausted, the drive shaft 85 is automatically shifted in a corresponding direction to cause the direction of feed of the ribbon to be reversed so that it is wound back on the exhausted spool.

The shiftable drive shaft 85 is resiliently held in either of its two extreme shifted positions by an over-center spring means which has not been shown in detail in the present drawings. Thus, as shown in part in Fig. 1, a pin 146 is carried at the rearward end of a member (not shown) which is pivotally mounted on the chassis of the machine and the pin 146 enters an annular groove 147 provided in the hub of the gear 86, and means are provided, which have not been shown, to coact with the member carrying the pin 146 in the usual manner to resiliently hold the drive shaft 85 either in a position wherein gear 86 meshes with the gear 88 or in its other position wherein gear 95 meshes with gear 97. It will be clear that the pin and slot connections 80—81 between the gear wheel 77 and the arm 82 allow the drive shaft 85 to be shifted longitudinally relative to the gear wheel 77 and yet maintain the positive driving connection between the gear 77 and the drive shaft 85 at either shifted position thereof.

In using a typewriting machine for cutting duplicator stencils or other types of work where ink is not transferred to the work sheet, it is often desirable to remove the inking ribbon as well as both of the ribbon spools from the machine. This removal of both of the ribbon spools from a machine employing automatic ribbon reversing mechanism of the present type would ordinarily permit the bell cranks 135 at both sides of the machine to swing outward about their respective pivots 136 and thereby release both of the plunger members 130. If both of the plungers 130 are permitted to drop to their lowered positions coacting with their respective spiral webs 140 and 144, a subsequent turning movement of the drive shaft 85 would cause both of the spiral webs 140 and 144 to simultaneously coact with their associated plungers 130 and thereby shift the drive shaft 85 slightly in one direction or the other until it becomes jammed or locked against further turning movement. This locking of the drive shaft 85 against rotation would accordingly prevent rotation of the spring drum 24 thereby preventing letter space movement of the carriage and rendering the machine inoperative.

In accordance with the present invention, means are provided which coact with at least one of the ribbon spools to prevent the associated plunger 130 from dropping when the spool is removed, thereby preventing the machine from being rendered inoperative by the removal of both of the ribbon spools. Said means in the present instance are associated with the left hand ribbon spool mechanism, and referring to Figs. 5, 6, and 7, it will be seen that a second crank arm 150 is pivotally mounted at 151 on a lug 152 depending from the flange 115 which normally carries the left hand ribbon spool 122. An opening 153 is provided in the guide sleeve 116 through which a bluntly pointed portion 150a of the upstanding arm of the crank arm 150 extends. When the left hand ribbon spool 122 is in place, as shown in Fig. 7, the portion 150a of the crank arm 150 engages the inner wall of the hub 123 of the spool. The left hand ribbon spool, when applied thus shifts the crank arm 150 to and holds it in its position shown in Fig. 7 against the force of a spring 154. The spring 154 as shown in Fig. 6 is in the form of a circular piece of flat spring metal having an eccentric opening therein and the outer portion thereof is secured at 155 to the flange 115. Thus the inner portion of the spring 154 engages the lower edge of the inwardly extending arm 150b of the crank 150 to exert an upward force thereon.

The inwardly extending arm 150b of the crank arm 150 is provided with a hook-shaped end portion which enters an opening 157 in the flattened upper portion of the plunger 130. When the left hand ribbon spool 122 is in place as shown in Fig. 7 this hook-shaped portion of the arm 150b is held in its lower position where the upper edge thereof is spaced downward from the upper end wall of the opening 157 a sufficient distance to allow the plunger 130 to move downward under control of the crank arm 135 in the normal manner to reverse the direction of the feed of the

ribbon when the supply of ribbon on the left hand spool is exhausted.

However, when the left hand ribbon spool is removed the crank arm 150 is turned by the force of the spring 154 to its position shown in Fig. 5 due to the disengagement of the hub 123 of the spool from the portion 150a of the crank arm. This movement of the crank arm 150 to its position shown in Fig. 5 causes the hook-shaped portion of the arm 150b to engage the upper end wall of the opening 157 in the plunger 130 and thereby hold the plunger in its upper position under the force of the spring 154. At this time the associated crank arm 135 is no longer effective to control the associated plunger. Thus, when both of the ribbon spools are removed from the machine, only the right hand plunger 130 will be allowed to drop into cooperative relation with the spiral web 144 on the drive shaft 85, the left hand plunger being maintained in its upper position by the crank arm 150. This prevents the machine from being rendered inoperative by the locking or jamming of the shiftable drive shaft 85 as would occur if both of the plungers 130 were allowed to drop into cooperative relation with their associated spiral webs.

It will be seen that I have thus provided an improved ribbon feeding mechanism wherein locking or holding means are provided to permit the typewriting machine to be operated with both of the ribbon spools removed thereby increasing the utility and flexibility of the machine. It will be clear that it is only necessary to provide this locking or holding means to coact with one of the ribbon spools, and further that such means are very simple and inexpensive in construction and yet operate to effectively and reliably hold one of the ribbon reversing members or plungers against operation when the associated spool is removed without in any manner interfering with the normal operation thereof when the ribbon spool is in place.

A further feature of the present ribbon feeding mechanism is in the arrangement of the parts to permit the interior chassis to be readily removed from the outer casing. In other words, it is desirable in the present machine to mount certain of the parts of the ribbon feeding mechanism on the outer casing while the remainder of the parts are mounted on the removable inner chassis, and connecting means have been provided in the feeding mechanism for the ribbon which are automatically disconnected when the chassis is removed and which are automatically brought into cooperative relation when the chassis is replaced. It will further be noted that this connecting means in the feeding mechanism for the ribbon not only allows the chassis to be readily removed but also affords longitudinal movement of the ribbon reversing drive shaft with relation to the parts carried by the outer casing. Thus, this particular connecting means has a definite cooperation with the ribbon reversing mechanism including the locking or holding means and has a particular value and significance when used in combination therewith.

Various changes may be made in the construction, and certain features thereof may be omitted without departing from my invention as it is defined in the accompanying claims.

What I claim as new and desire to secure by Letters Patent is:

1. In a typewriting or like machine, the combination of an exterior frame, a chassis removably mounted in said frame, a carriage mounted for movement on said exterior frame, ribbon driving means mounted on said exterior frame and operatively connected with said carriage, ribbon spool carrying means mounted on said chassis, and means for operatively connecting said ribbon driving means on said exterior frame with said ribbon spool carrying means on said chassis, said means including a rotatable part on said chassis, a rotatable part on said exterior frame disposed in axial alignment with said rotatable part on the chassis, and cooperating members on said rotatable parts which are engageable at points spaced outwardly from the periphery of said rotatable part on the chassis and arranged to be automatically disengaged when said chassis is removed from said exterior frame and automatically reengaged when said chassis is replaced.

2. In a typewriting or like machine, the combination of an exterior frame, a chassis removably mounted in said frame, ribbon driving means mounted in said exterior frame, a ribbon reversing shaft mounted in said chassis for shifting movements in the direction of its length, and means for operatively connecting said ribbon driving means with said ribbon reversing shaft regardless of the shifted position thereof, said means including cooperative engageable parts in axial alignment on said ribbon driving means and said ribbon reversing shaft which are automatically disengaged when said chassis is removed from said exterior frame and automatically reengaged when said chassis is replaced.

3. In a typewriting or like machine, the combination of an exterior frame, a chassis removably mounted in said frame, a ribbon reversing shaft mounted in said chassis for shifting movements in the direction of its length, ribbon driving means mounted in said exterior frame including a rotatable part disposed in axial alignment with said reversing shaft, and means for operatively connecting said rotatable part with said reversing shaft regardless of the shifted position thereof, said means including a pin carried by said rotatable part in spaced parallel relation to the axis thereof and an arm carried by said reversing shaft in contactive relation to the side of said pin to permit the removal of said chassis from said exterior frame.

4. In a typewriting or like machine, the combination of a ribbon carrying member, mounting means for removably holding said ribbon carrying member, drive means shiftable into and out of operative relation with said mounting means, shifting means for said drive means including a shifting member movable to and from effective position, a first control means carried by said mounting means and coacting with said ribbon carrying member and said shifting member to allow the latter to move to effective position only when the ribbon carrying member is in place on the mounting means, a second control means carried by said mounting means and coacting with the ribbon on said carrying member to move from normal position when the supply of ribbon is substantially exhausted, and means connecting said shifting member with said second control means to hold the shifting member from effective position when the second control means is in normal position and to afford movement of the second control means when the shifting member is held from effective position by the first control means.

5. In a typewriting or like machine, the combination of a ribbon carrying member, mounting

means for removably holding said ribbon carrying member, drive means shiftable into and out of operative relation with said mounting means, shifting means for said drive means including a plunger movable by gravity to effective position, a bell crank pivotally mounted on said mounting means and having one arm thereof coacting with said ribbon carrying member and the other arm thereof coacting with said plunger to allow the latter to move to effective position only when the ribbon carrying member is in place on said mounting means, control means carried by said mounting means to coact with the ribbon on said mounting member and move from holding position when the supply of ribbon is substantially exhausted, and connecting means including an opening in said plunger having a wall coacting with said control means to hold the plunger from effective position when the control means is in holding position and to afford movement of the control means when the plunger is held from effective position by said bell crank.

RUSSELL G. THOMPSON.