

Oct. 30, 1945.

C. WALKER

2,387,785

TYPEWRITING MACHINE

Filed March 1, 1944

4 Sheets-Sheet 1

Fig. 1

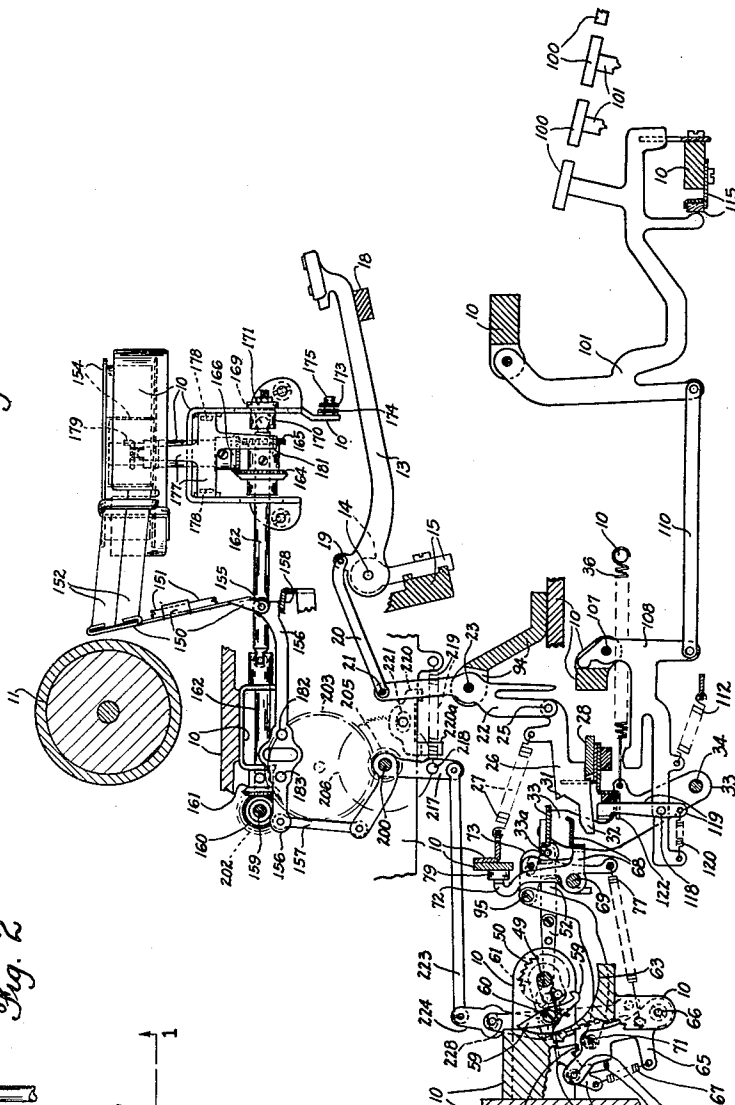


Fig. 2

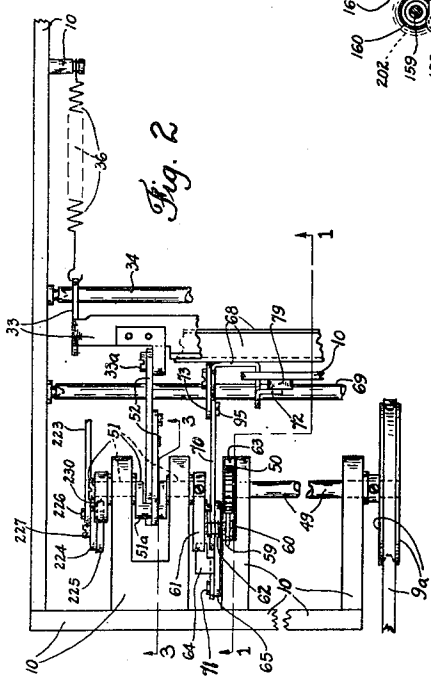
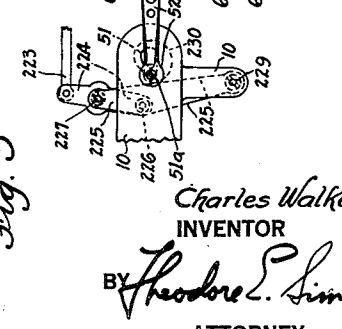


Fig. 3



Charles Walker
 INVENTOR
 BY Theodore P. Simonton
 ATTORNEY

Oct. 30, 1945.

C. WALKER

2,387,785

TYPEWRITING MACHINE

Filed March 1, 1944

4 Sheets-Sheet 2

Fig. 4

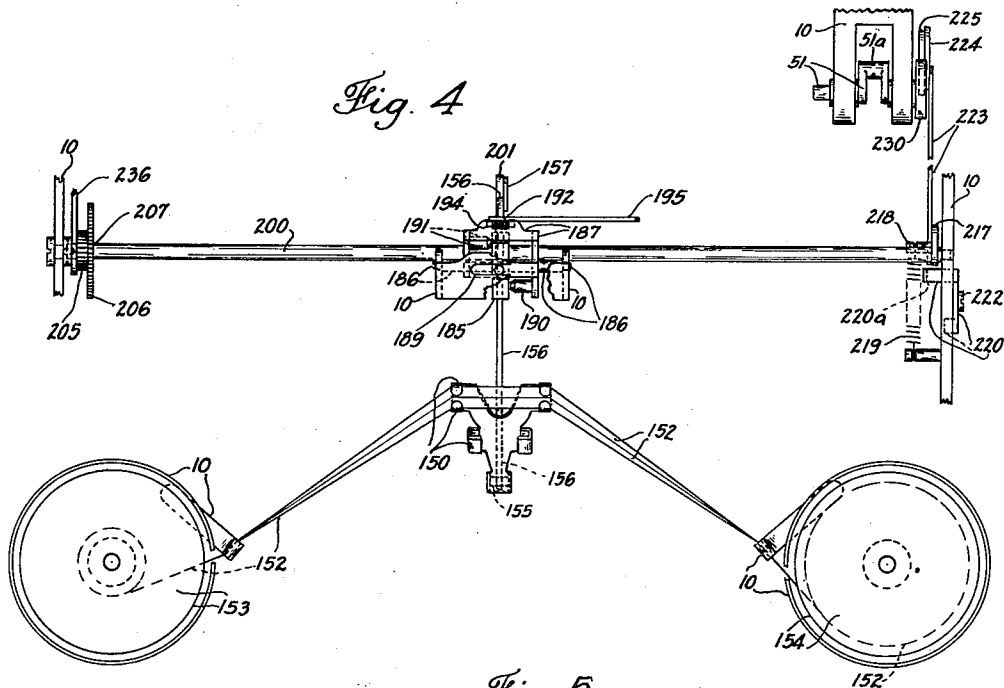


Fig. 5

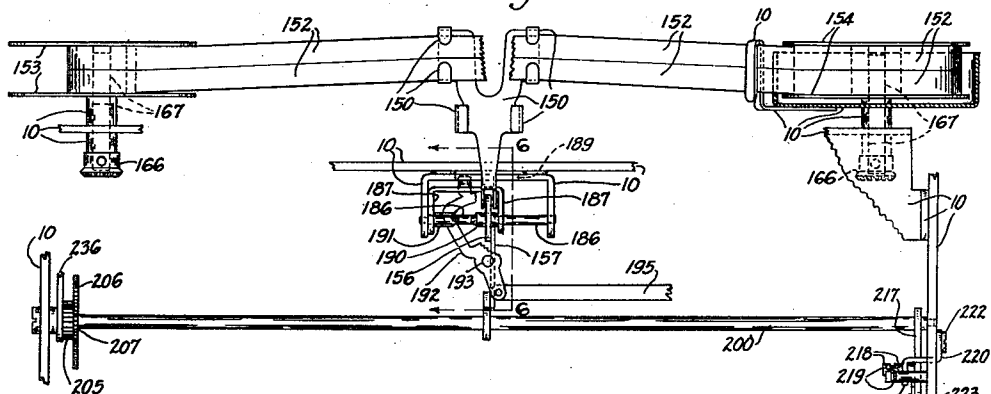


Fig. 6

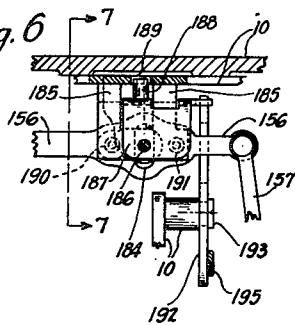
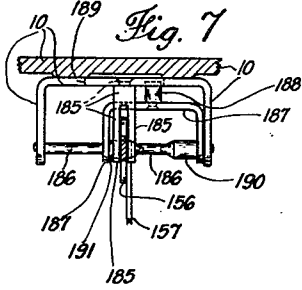


Fig. 7



Charles Walker
INVENTOR
BY Theodore E. Simonton
ATTORNEY

Oct. 30, 1945.

C. WALKER

2,387,785

TYPEWRITING MACHINE

Filed March 1, 1944

4 Sheets-Sheet 3

Fig. 9

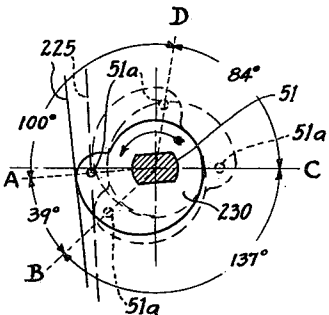
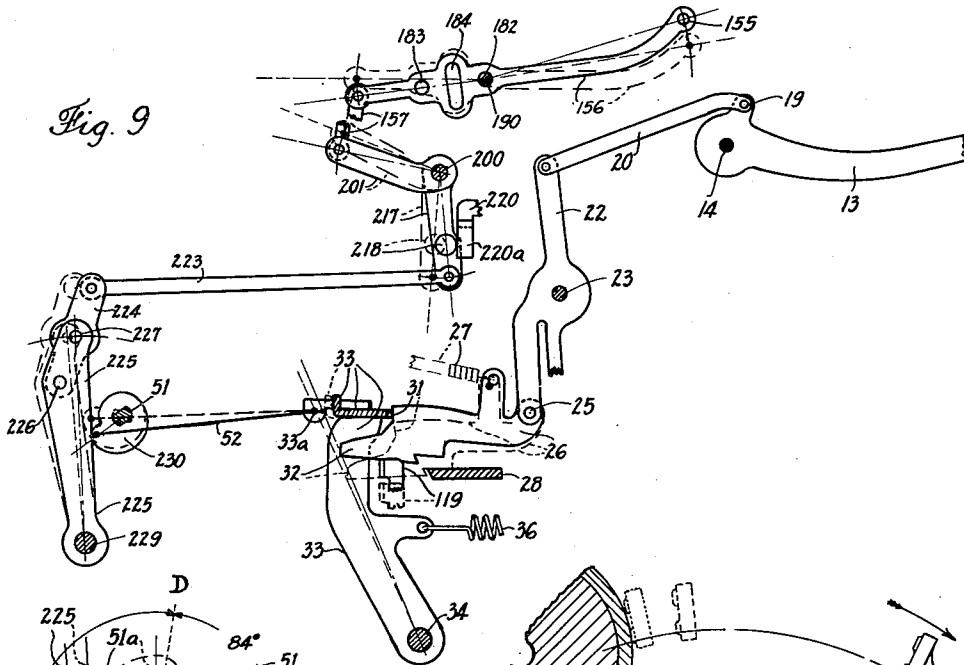
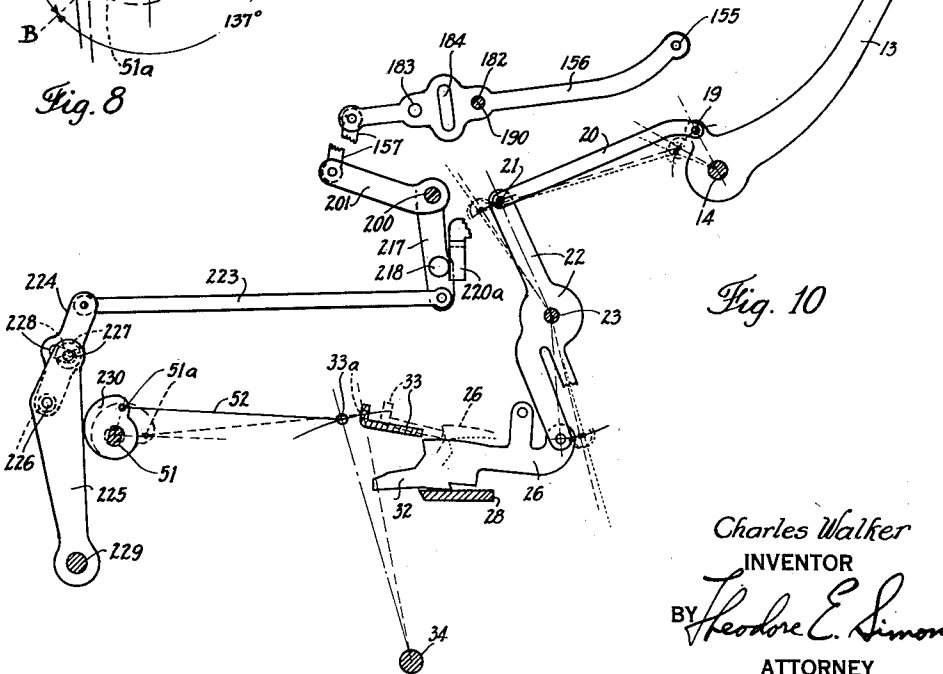


Fig. 8

Fig. 10



Charles Walker
INVENTOR
BY Theodore E. Simonton
ATTORNEY

UNITED STATES PATENT OFFICE

2,387,785

TYPEWRITING MACHINE

Charles Walker, Syracuse, N. Y., assignor to L. C. Smith & Corona Typewriters, Inc., Syracuse, N. Y., a corporation of New York

Application March 1, 1944, Serial No. 524,506

20 Claims. (Cl. 197—154)

The invention relates to improvements in typewriting machines and, more particularly, to improvements in typewriting machines of the kind wherein the type impressions are inked through the medium of an inked ribbon.

The general purpose of the invention is to provide in such machines an improved construction and arrangement whereby the type impressing means and the inking ribbon motivating means are operated with improved efficiency both with respect to the formation of properly inked type impressions and to the distribution and timing of the efforts employed in motivating the types and ribbon.

A further purpose of the invention is to provide an improved visible typing typewriting machine having types, ribbon feeding, ribbon feed reversing, and ribbon vibrating means all motivated in efficiently timed relation and with a minimum of shock by power other than applied by a typist in using the machine.

A further purpose of the invention is to provide in a typewriting machine an improved power actuated ribbon mechanism responsive in an improved manner to activation of the type impression forming means of the machine.

A further purpose of the invention is to provide a visible typing typewriting machine having an improved construction whereby, in making an inked type impression, the printing point covering stroke of a ribbon vibrator is made before the impressing stroke of the type starts or before any substantial part of said type stroke has been completed, the return stroke of the vibrator does not start before any substantial part of the return stroke of the type remains uncompleted, and the ribbon feed motion is imparted to the ribbon during the return stroke only of the ribbon vibrator.

A further purpose of the invention is to provide, in a typewriting machine having a ribbon vibrator and a ribbon feed pawl, a construction wherein the printing point covering stroke of the ribbon vibrator and the idle stroke of the ribbon feed pawl are both imparted by the power of a spring and the opposite strokes of said vibrator and pawl are both imparted by the power of a motor, such as an electric motor, which runs constantly when the machine is in use.

Further purposes of the invention are to provide improved power means for vibrating the inking ribbon of a visible typing typewriting machine, and to provide improved power means for feeding the inking ribbon of a typewriting machine.

Other purposes and advantages of the invention will appear and be obvious to those skilled in the art from the following description of the preferred embodiment of the invention shown in the accompanying drawings.

Figure 1 of the drawings is a fragmentary vertical sectional view of the improved machine taken approximately on the line 1—1 of Figure 2, certain parts being omitted for clarity of illustration.

Figure 2 is a detail view showing in top plan certain features of the machine.

Figure 3 is a detail vertical sectional view on the line 3—3 of Figure 2.

Figure 4 is a detail view showing in top plan certain features of the ribbon activating means.

Figure 5 is a detail view showing in front elevation the parts disclosed in Figure 4.

Figure 6 is a detail sectional view taken approximately on the line 6—6 of Figure 5.

Figure 7 is a detail sectional view taken on line 7—7 of Figure 6.

Figure 8 is a diagrammatic view hereinafter more fully explained in connection with the timing of the type and ribbon movements.

Figures 9 and 10 are views similar to Figure 1 (with certain parts omitted) illustrating the timing of the type and ribbon movements.

Figure 11 is a detail view showing a part of the ribbon motivating mechanism as viewed from the left hand side of the machine, this view showing the mechanism in the position assumed at the end of its spring driven movement.

Figures 12 and 13 are fragmentary top plan views and front elevations, respectively, of the ribbon feed means as conditioned for start of a reversal of feed direction.

In the preferred embodiment of the invention shown, the machine has numerous known parts which will first be described.

A suitable stationary main framework 10 supports the working parts of the machine. A roller platen 11 is carried, by a platen carriage (not shown), to travel back and forth transversely of the framework. Each type bar of a set of type bars, one of which is shown at 13, has a pivot mounting 14 in a type bar segment 15 mounted in framework 10, and the type bars are normally supported adjacent their forward ends by a type bar rest 18.

A ribbon vibrator or vibratory ribbon guide 150 is slidably guided to move up and down on a type bar guide which is shown, in part, at 151. A bichrome inking ribbon 152 is attached at its opposite ends to two ribbon spools 153 and 154

for reeling of the ribbon upon first one and then the other of the spools and is threaded through guide 150 for vibration of the ribbon by the ribbon guide to cover and uncover the printing point of the machine.

The ribbon vibrator or vibratory ribbon guide 150 is pivoted at 155 to a fore and aft extending lever 156 which, except when the machine is set for stencil cutting, is rockable by a link 157 to move the vibrator up from and down to a normal idle position in which the ribbon is positioned to uncover the printing point of the machine. The lever 156 is mounted on framework 10 in a known manner for conditioning of the machine for vibrating the ribbon 152 to effect inking of a type impression by either the upper or lower color zone of said ribbon, as desired, and for conditioning the machine for non-vibration of the ribbon 152 when the machine is used for stencil cutting. The lever 156 has spaced apart longitudinally thereof two circular fulcrum holes 182 and 183 which extend transversely through the lever, and said lever also has formed therein intermediate said fulcrum holes an up and down extending retaining slot 184. The right and left hand side faces of lever 156 are loosely contacted by guide means 185 fixed to and pendent from framework 10 to prevent movement of said lever transversely of the machine while permitting up and down rocking of the lever. A retaining rod 186 extends horizontally transversely of the machine loosely through retaining slot 184 in lever 156 and is fixed to framework 10. A slide 187 is slidably mounted on said rod 186 to slide thereon longitudinally of the rod, and also has a guide stud 188 slidable along and in a transversely extending guide slot 189 in a part of framework 10, for movement of said slide horizontally transversely of the machine. The slide 187 has fixed thereto two fulcrum pins 190 and 191 for lever 156, which pins extend inward in opposite directions horizontally and transversely of the machine and are fixedly anchored at their outer ends to the slide with the inner ends of the pins spaced apart fore and aft of the machine for entry of either pin 190 in fulcrum hole 182 in lever 156 or of pin 191 in fulcrum hole 183 in lever 156. The inner ends of the pins are conical or tapered to facilitate entry thereof in their respective holes and are so spaced apart transversely of the machine that only one of said pins at a time may be engaged in its associated fulcrum hole to serve as a fulcrum for lever 156. or said pins may be positioned with neither one thereof engaged in its fulcrum hole in lever 156.

A known manual shifting or setting means for slide 187 is provided and comprises a lever 192 fulcrumed on framework 10 at 193 to swing about an axis extending fore and aft of the machine. The upper end of lever 192 is engaged in a notch 194 in slide 187 and said lever is rockably adjusted about its pivotal axis by means of the link 195 which is connected at one end to the lower end of lever 192 and is connected at its other end to a setting handle element (not shown) mounted on framework 10. In Figure 4, the slide is shown in its medially adjusted position for stencil cutting, in Figure 7 the slide is shown adjusted for fulcruming of lever 156 on pin 191 for typing in red with the lower red zone of ribbon 152, and in Figures 5, 6, 9 and 10 the slide is shown positioned for fulcruming of lever 156 on pin 190 for typing in black with the upper or black zone of ribbon 152. There is provided on framework 10 an up and down bendably adjust-

able support 158 to support the forward end of lever 156 when both fulcrum pins 190 and 191 are disengaged from said lever. Lever 156 fulcrums on this support during use of the machine for stencil cutting.

A common drive shaft 159 for the ribbon spools extends horizontally transversely of the machine substantially from side to side of the machine and is journaled in framework 10 in which said shaft is held against axial movement. Two outwardly facing bevel gears 160 are located adjacent opposite sides of the machine and are fixed to said shaft 159 with said gears in mesh respectively with two rearwardly facing bevel gears 161 so that the latter gears rotate in opposite directions whenever shaft 159 is rotated. Gears 161 are fixed respectively on the rear ends of two jointed and fore and aft extending spool driving shafts 162, one for each spool, located adjacent opposite sides of the machine. Each jointed shaft 162 comprises a front section and a rear section, which sections are connected by a universal driving joint 163, the rear section of each said shaft being journaled in the framework 10. Each shaft 162 has fixed thereto one of two forwardly facing bevel gears 164 and one of two ratchet wheels 165, the ratchet wheels being located forward of the respective gears 164 and being of smaller diameter than said gears.

Known means are provided for tilting upward and holding up the forward section of either shaft 162 and concomitantly tilting downward and holding down the forward section of the other shaft 162 for positive driving of only one spool at a time from shaft 159. In the upward tilted position of the front section of either shaft, the gear 164 thereon is in mesh with the associated one of two downwardly facing bevel gears 166, and in the downwardly tilted position of said front section, the gear 164 thereon is demeshed from its associated gear 166. The gears 166 are fixed on the lower ends of two upstanding ribbon spool carrying shafts 167, which shafts are journaled in framework 10 and are located adjacent opposite sides of the machine. The ribbon spool 153 is held to the left hand one of the shafts 167 to rotate with said shaft, and the ribbon spool 154 is held to the right hand one of the shafts 167 to rotate with the shaft.

The ribbon spools are of like construction, each spool having a gap or aperture 168 (Figure 13) in its core or barrel. At its front end each jointed shaft 162 has a substantially spherical knob 169 engaged in a rearwardly facing socket element 170 fixed on the laterally outwardly extending arm of the adjacent one of two bellcrank levers 171. Levers 171 are located adjacent opposite sides of the machine, and each lever is held to the framework 10 by a fore and aft extending pivot 172 and has a second arm pendent from its point of pivotal connection with the framework. The pendent arms of levers 171 are connected by a cross link 173 which is movable substantially endwise to engage a latch hump 174a on a detent arm 174 at either the left or right side of a latch pin 175 fixed on framework 10. Detent arm 174 is pivoted to one end of link 173 at 173a, and a spring 176 is anchored to framework 10 and to said detent arm to releasably yieldingly hold said arm and link 173 against movement transversely of the machine at each limit of the endwise shifting movement of the link, i. e., in each latched position of the link. In each latched position of the link a different one of the spools is geared

to shaft 159. Stop pins 235 (Figures 12 and 13) may be provided on framework 10 for engagement by bellcrank levers 171 to limit gear-engaging movement of each lever.

The direction of feed of the ribbon may obviously be reversed by manually shifting the link 173 endwise, but the following known means are provided for automatically reversing the direction of feed of the ribbon upon exhaustion of the ribbon from either spool. Two automatic ribbon reversing control levers 177 are associated with the spools, one for each spool. Each lever 177 has a pivotal connection 178 with framework 10, the axis of said pivot extending fore and aft of the machine. The upper end of each lever 177 extends up into the hollow core of the adjacent spool, which core is open at its lower end, and each lever has at its upper end a lateral projection 179 which, when the gap or aperture 168 in said core is opposite said projection and is uncovered by exhaustion of the ribbon from that spool, is movable out through said gap 168 to permit the lever 177 to be swung by a spring 180 to engage a nose 181 (formed on the lower end of the lever) with the toothed periphery of the adjacent ratchet wheel 165. Each lever 177 has a spring 180 connected therewith and with framework 10. After the engagement of nose 181 with the associated ratchet wheel 165, a short angle of rotation of said wheel will tilt the front section of the associated shaft 162 upward to mesh the adjacent pair of driving gears 164 and 166 for the empty spool.

All of the foregoing described parts of the machine shown are known, and are shown and described as exemplifications of parts for use for like purposes in connection with the present invention. Said foregoing parts are constructed and arranged substantially as in the known L C Smith Series 1 Super Speed typewriting machine, and also correspond generally with the disclosure of United States patents to Carl Gabrielson, No. 929,933, issued August 3, 1909, and No. 958,388, issued May 17, 1910. It will be apparent hereinafter, however, to those skilled in the art that the construction of the improved machine, as so far described, may be widely varied.

The improved conjoint action of a desired type carrier and of the ribbon 152 to form a properly inked type impression is effected, in the preferred construction shown, by means which will now be described. A part of this means, in the preferred construction, consists of key controlled power means for selectively actuating the type bars 13, which type bar actuating means is not claimed per se herein but forms the subject matter of my copending application for United States patent filed November 26, 1942, Serial No. 466,989. As will be apparent hereinafter to those skilled in the art, this type bar actuating means may be varied from that shown and about to be described, for example, other means such as those disclosed in United States patents to Crawley Reissue No. 15,640, No. 1,455,112 or No. 1,503,033 might be employed.

In the improved machine shown, a universal type bar actuator 33 is provided in the rear part of the machine for actuating the type bars 13. Actuator 33 has pendent side arms which are fixed to a horizontal rock shaft 34 which extends transversely of the machine and is journaled in framework 10. To impel the actuator forwardly to drive any selected type bar to print, there is connected to framework 10 and the actuator at

least one constantly tensioned pull spring 36. After each spring impelled stroke thereof, said actuator is retracted instantly to a normal idle position (shown in Figures 1 and 2) by power from an electric motor (not shown), which motor is mounted in framework 10 and runs constantly while the machine is in use. Through a suitable pulley and belt drive means, shown in part at 9a, said motor constantly rotates while the machine is in use a power shaft 49. The motor rotates shaft 49 counterclockwise, as the parts are viewed in Figures 1 and 2, and said shaft extends horizontally transversely of the machine and is journaled in framework 10.

A ratchet wheel 50 is fixed on the right hand end of shaft 49, and to the right of said ratchet wheel there is journaled in framework 10 a short crank shaft 51 for rotation about an axis coincident with the axis of shaft 49. A pitman 52 connects the wrist of crank shaft 51 with the crossbar of actuator 33 at 33a.

The crank shaft 51 is rotated through one complete revolution from the normal idle position thereof, shown in Figures 1 and 2, whenever one of the type keys 100 of the machine is depressed. The first half of each such revolution is imparted to the crank shaft by the forward or spring impelled stroke of the actuator 33 and, as the actuator completes its forward stroke, said crank shaft is clutched or connected to shaft 49 through the medium of ratchet wheel 50 and a pawl or dog 59 for rotation of the crank shaft through the remainder of its revolution back to normal position, and resultant retraction of the actuator to its normal position, by power from the shaft 49 against the resistance of the actuator impelling spring or springs 36.

The dog 59 is pivoted at 60 on a dog carrier 61. The dog carrier 61 is fixed on the left hand end of crank shaft 51 to rotate opposite the right hand face of ratchet wheel 50 and the dog 59 is constantly biased by a torsion spring 62 for engagement of the nose of the dog with the teeth of ratchet wheel 50. A part of framework 10 is formed with an arcuate dog-controlling surface 63 which is curved downwardly behind and under the periphery of the ratchet wheel 50 concentrically with the coincident axes of shafts 49 and 51. This surface 63 extends about said axes for somewhat less than 180 degrees and is so disposed that a tail portion of dog 59 is engaged with said surface at the upper end of the latter (as indicated more clearly in Figure 1) when crank shaft 51 and actuator 33 are in normal position. In the normal position of the crank shaft and actuator, the wrist of the crank shaft is to the rear of the axis of said shaft and slightly below dead center, and the outer end of the dog carrier 61 is seated upon and held arrested by a suitable spring-cushioned stop 64.

Stop 64 is pivoted at 64c on a fore and aft rockable arm 65 which is in turn pivoted at its lower end at 66 on framework 10. Stop lugs 64a and 65b limit rocking of lever 64 relatively to arm 65, and a stiff spring 67 normally holds the forward end of lever 64 elevated to the upper limit of its motion. Arm 65 is urged forward to its normal position by a return spring 77 connected to a release bar 68, and said arm is rockable rearward from normal position by the universal release bar 68 to release the dog carrier and thereby initiate a single revolution of the crank shaft 51. The universal release bar 68 extends horizontally transversely of the machine and is rocked by spring 77 to a normal position inter-

mediate the crossbar of actuator 33 and the reduced rear end portions or fingers 32 of a set of type action couplers 26, one of which couplers is shown in Figures 1, 9 and 10 of the drawings. This release bar 68 is fixed to a rock shaft 69 which extends horizontally transversely of the machine at the rear of said bar and is journaled in framework 10. A link 70 is pivoted at 71 to arm 65 and is pivoted at 96 to an arm 73 fixed on rock shaft 69. Spring return movement of the release bar and arm 65 to normal position by spring 77 is limited by a stop 72 held to the release bar 68 and to arm 73, which stop is normally pressed forward against a cushion stop 79 held to framework 10.

The release bar 68 is rockable upward and rearward to free the crank shaft 51 and actuator 33 upon depression of any type key 100, and is restored automatically by spring 77 to normal position before the crank shaft 51 and the dog carrier 61 complete a single revolution whether or not the depressed key is released before said revolution is completed. It will be noted that crank shaft 51 is spring rotated through the first half of each revolution and is rotated by the motor driven shaft 49 through the second half of each revolution, the force of the motor driving shaft 49 being superior to the spring power tending to advance the actuator 33.

There is one of the couplers or interponents 26 for each type bar, and there is also a coupler lifter 119 for each coupler 26, the several couplers or interponents being normally seated on a rest 28 held to framework 10. A return spring 27 is provided for each type bar 13 and its coupler or interponent 26, each such spring being anchored to framework 10 and to a coupler 26. Each coupler lifter is connected with a different one of the keys 100 for actuation by depression of its connected key to raise the associated coupler to cause finger 32 of the coupler to rock the release bar upward and rearward and thereby both release shaft 51 and interpose a shoulder 31 on the coupler for engagement by the front edge of the crossbar of the type bar actuator 33 to impel the selected type bar to printing position on the spring impelled stroke of the actuator, and also to permit the impelled type bar and its coupler to immediately resume normal idle position under the influence of the associated return spring 27 after completion of the printing stroke of the type bar. Each coupler or interponent 26 has a pivotal connection 25 with a different one of a set of sub-levers 22. Each sub-lever is pivoted on a pivot wire 23 in a segment 94 suitably fixed to framework 10, and each sub-lever is connected with a different type bar by one of a set of pull links 20, each link having a pivotal connection 19 with its associated type bar and a pivotal connection 21 with its associated sub-lever.

The key levers 101 are fulcrumed on a pivot wire 104 held to framework 10. Each lifter 119 for the couplers or interponents 26 is connected with a different key lever and is guided in a suitable guide comb 122 on framework 10. The connection between each lifter and its associated key lever comprises a pivot 118 and a spring 120 which connect the lifter to its associated one of a series of sub-levers 108. The sub-levers 108 are fulcrumed on a pivot wire 107 carried by framework 10, each sub-lever being connected to its associated key lever by a different one of a series of connecting links 110. For each key lever there is provided a return spring 112 connected with the

framework 10 and the appropriate sub-lever 108 to yieldingly hold the key lever against a return stop 115 on framework 10.

The new parts of the improved machine, and the manner in which said new parts are combined with the above described parts to accomplish the several purposes of the present invention, will now be described.

The bichrome inking ribbon 152 is fed and vibrated in the hereinafter described timed relation with the strokes of each actuated type bar through the medium of a rock shaft 200 and of means hereinafter described for oscillating said shaft. The rock shaft 200 is journaled in framework 10 and extends horizontally across the machine behind the sub-levers 22 connected with the respective type bars 13 and under the ribbon guide vibrating lever 156.

The rockable or oscillative shaft 200 is connected with the hereinbefore described known parts of the ribbon vibrating means by reason of the fact that in the present construction the link 157 is pivotally connected at its lower end to the rear end of a rock arm 201, which arm is fixed to shaft 200 substantially medially of the sides of the machine and extends rearward from said shaft.

The shaft 200 is also connected with the hereinbefore described known parts of the ribbon feeding and feed reversing means, and this connection will next be described.

Fixed on the left hand end of the rotative shaft 159 is a gear or pinion 202 in constant mesh with a larger gear or pinion 203. Gear 203 is journaled on a suitable stationary stub shaft 204, which stub shaft extends horizontally parallel to shaft 159. Gear 203 is in constant mesh with a smaller gear or pinion 205. Gear 205 is fixed to and coaxial with a larger ratchet wheel 206, and said gear and ratchet wheel are loose on, or rotative about, a reduced end portion of rock shaft 200 adjacent the left hand end of said rock shaft. Gear 205 and ratchet wheel 206 are held against axial movement along shaft 200 by being confined between the framework 10 and a shoulder 207 provided on said shaft at the inner end of the reduced end portion of said shaft. The gear system just described provides a speed reducing drive from ratchet wheel 206 to shaft 159.

A driving pawl 208 is associated with the ratchet wheel 206 to rotate the wheel in a clockwise direction as said wheel is viewed in Figures 1 and 11 to feed the ribbon, and a back check pawl 209 is associated with the ratchet wheel to prevent reverse rotation of said wheel. The back check pawl 209 is pivoted on the stub shaft or screw stud 204 and is pressed to the toothed periphery of the ratchet wheel 206 by a spring 210 engaged with the pawl and a screw 237 to normally maintain the nose of the pawl yieldingly between two adjacent teeth of the wheel to prevent said reverse rotation of the wheel but permit driving of the wheel in ribbon feeding direction by driving pawl 208. The stub shaft 204 is fixed to a plate 236 which is loosely pivoted on rock shaft 200 for slight pivotal adjustment about said shaft. Plate 236 is held in adjusted position about shaft 200 by the clamping screw 237 which is threaded in said plate with its shank extending through a hole 238 in framework 10 larger than the shank. The driving pawl 208 is pivoted at 211 on the upper arm of a bellcrank shaped pawl carrier 212 which is loosely journaled on rock shaft 200. The lower arm of pawl

carrier 212 has a short arcuate slot 213 therein for adjustable clamping of said arm to the lower end of a pendent rock arm 214 fixed on shaft 200 adjacent the left hand side of the machine. The pawl carrier is adjustably clamped to rock arm 214, to rock with shaft 200, by means of a clamping screw 215 which extends through slot 213 in the pawl carrier and is threaded into arm 214. A spring 216, connected to the pawl 203 and the pawl carrier 212, normally presses the nose of the pawl yieldingly between two adjacent teeth of the ratchet wheel.

From the foregoing, it will be seen that shaft 200 is connected with the ribbon feeding and vibrating means to actuate said means through oscillation of said shaft. The means shown by which the shaft 200 is oscillated in a manner to accomplish the desired ends, will now be described.

Fixed to, and pendent from, the rock shaft 200 adjacent the right hand side of the machine is a rock arm 217 having fixed thereto below said shaft a combined stop and spring anchor pin 218 which extends transversely of the machine. A light power spring 219 is anchored to said pin 218 and to the framework 10 to constantly tend to impel the rock arm 217 forwardly to a limit determined by engagement of pin 218 with an adjustable stop 220—220a on framework 10. The adjustable stop has a fore and aft extending slot 221 therein through which extends a clamping screw 222 threaded into framework 10 to clamp the stop to the framework 10 in fore and aft adjusted position. Said stop has two arms which slidably engage under a fore and aft extending horizontal edge portion of the framework 10, and the rearmost one of said arms has a pendent portion 220a which the stop pin 218 is adapted to abut to limit forward rocking of arm 217 by the pull spring 219.

Normally the arm 217 is held rocked rearward a predetermined extent against the pull of the spring 219 from the limit of forward movement of said arm determined by engagement of pin 218 with the abutment portion 220a of stop 220. Retraction of arm 217 to said normal position is effected by power from the motor driven shaft 40, and the means whereby said arm is retracted to and releasably locked in normal position, and whereby said arm is unlocked for driving thereof by spring 219, will now be described.

To the lower end of rock arm 217 there is pivoted the forward end of a link 223, and the rear end of this link is pivoted to the upper end of the upper section 224 of a two-part upstanding rock arm 224—225. The upstanding rock arm 224—225 extends upward behind the right hand end of crank shaft 51, and the lower section 225 of said rock arm is journaled at its lower end at 229 on the framework 10 for rocking of said arm fore and aft of the machine transversely of the axis of crank shaft 51. The two sections of arm 224—225 are pivotally connected by a pivot 226 for pivotal adjustment therebetween about an axis parallel to the pivotal axis of the arm, and said sections are clamped together, to rock as a unit in their adjusted relation, by means of a clamping screw 227 which is threaded into section 225 and extends through a short slot 228 in section 224.

Fixed on the right hand end of crank shaft 51 is a cam 230 having a single high portion. In the normal latched position of the crank shaft 51, the apex of the high portion of the cam 230 contacts the forward edge of the lower section 225

of rock arm 224—225 behind, and preferably also slightly below, the axis of rotation of the crank shaft and, therefore, normally holds said rock arm 224—225 and rock arm 217 retracted against the pull of power spring 219 into a predetermined normal retracted position of said arms.

By the construction described, the shaft 200 may be oscillated a fixed extent. Its normal position may be variably adjusted by relatively adjusting the two sections of arm 224—225 to correctly position the ribbon guide to locate the upper edge of the inking ribbon for desired uncoverage of the printing point of the machine. Its limit of movement from normal position and, consequently its extent of throw, may be variably adjusted by adjustment of stop 220—220a to insure that only the desired zone of the ribbon will be contacted by the type. Neither of these adjustments affects the other, or affects the latched position of the type bar actuator and cam 230. The adjustment described above to determine the normal position of the feed pawl 208 without disturbing the normal position of the rock shaft 200, permits such normal positioning of feed pawl 208 relatively to the teeth of the ratchet wheel 206 as to insure accuracy of extent of ribbon feed at the type strokes.

Referring especially to Figure 8, it will be noted that the periphery of cam 230 is so shaped that it is concentric with the axis of the cam and of the crank shaft 51 throughout substantially more than half way around the cam axis. The cam periphery has a single high portion the apex of which is normally located at position A of the wrist 51a (Figure 8) of crank shaft 51. The high portion of the cam drops abruptly from its apex to the long concentric low portion at the trailing edge of said high portion and drops very gradually to the low concentric portion at the leading edge of said high portion.

In the normal idle condition of the machine and normal latched position of crank shaft 51 and cam 230, the wrist 51a of crank shaft 51 is at position A (Figure 8) and the cam is positioned as shown in full lines in Figure 8 with the apex of the high portion of the cam engaged with section 225 of arm 224—225 to hold said arm at its motor retracted limit of reciprocation against the pull of spring 219. When any one of the type selecting keys is actuated, an inked impression of the selected type is effected and the parts re-assume normal position in the following described manner.

Depression of the selected key 100 rocks the coupler or interponent 26, associated therewith and connected with the selected type bar 13, upward in front of the actuator 33 and thereby rocks the release bar 68 to unlock the crank shaft 51, type bar actuator 33 and cam 230. The actuator 33 is then impelled forward by spring 36 to its forward limit of motion in doing which it rotates crank shaft 51 and cam 230 through substantially one-half of a revolution and impels the selected type bar toward the printing point of the machine.

On its forward spring impelled stroke, the actuator 33 first moves into engagement with the lifted one of the couplers 26 and then drives said coupler to impel the type bar connected therewith from the rest 18 toward the printing point. At the time the actuator 33 engages said coupler and starts to impel said type bar, or at most after a very slight further advance of the actuator, the crank 51 has rotated counterclockwise (as viewed in Figure 8) to shift its wrist 51a

and the apex of the high portion of cam 230 to position B, and the spring 219 has pulled arm 224—225 and arm 217 to the position shown in full lines in Figure 9, in which position the stop pin 218 is engaged (or at least substantially engaged) with stop 220—220a. Section 225 of arm 224—225 therefore cannot at any time in the revolution of the cam advance into contact with the low portion of the cam periphery.

It will thus be seen that at position "B" of the cam spring 219 has caused a complete throw of arm 217 and rock shaft 200 in one direction from normal position and has thus completed the idle or non-working stroke of the ribbon feed actuating pawl 208 and also has completed the down stroke of the link 157 connected to the ribbon guide vibrating lever 156. Since, ordinarily, one or the other of the fulcrum pins 190 and 191 is engaged with lever 156, it will also be seen that when the cam reaches position B, the lever 156 will have been rocked about the engaged fulcrum pin to raise the ribbon vibrator or guide 150 to the desired limit to cover the printing point with the desired zone of the bichrome inking ribbon 152. If the machine were, however, set for stencil cutting, the lever 156 would fulcrum in the known manner on the support 158 without moving the ribbon vibrator or guide 150. No further movement of the ribbon mechanism will take place until the actuated type bar has been substantially completely returned to its normal position against rest 18 by its return spring 27 and the actuator 33, crank shaft 51 and cam 230 have been nearly restored to normal latched position.

At the end of the forward stroke of actuator 33, the type bar is still slightly short of impression forming position and moves to said position by its acquired momentum (see dotted positions of the type bar head in Figure 10), after which it and its coupler, and the connecting parts therebetween, are quickly restored to normal position by spring 27 connected with the bar coupler.

Immediately upon reaching the end of its forward stroke, the type bar actuator is retracted and latched by the motor controlled mechanism which coincidentally completes the revolution of cam 230 and the latching thereof in normal position. The actuator reaches the limit of its forward spring-impelled stroke when the wrist 51a and the apex of the high portion of cam 230 are rotated to position C (Figure 8), and the periphery of said cam is out of contact with arm 224—225 while the wrist 51a and apex of the high portion of the cam rotate from position B to position D (Figure 8). In rotating from position D to position A, the gradually rising leading edge of the high portion of cam 230 engages the arm 224—225 substantially without shock and quickly retracts said arm to its normal latched position against the pull of spring 219 and thus lowers the ribbon guide 150 to normal position and moves the ribbon feed pawl 208 through the working stroke of said pawl to feed the ribbon. In Figure 10, the moving type bar 13 is shown in full lines on its return stroke about half way back to the rest 18, with wrist 51a and cam 230 at position D (Figure 8) and the type bar actuator partly retracted, and the cam and type bar actuator are shown in dotted lines with the cam at position C (Figure 8) and the actuator at the limit of its type bar impelling stroke.

It will be noted that there is no possibility of the actuated type bar reaching impressing posi-

tion before the ribbon covers the printing point, that there is no possibility of the ribbon being moved either up or down or lengthwise at the printing point while the types on a type bar are at or near the printing point, that a substantially shockless and quiet action of the ribbon feed and vibrating devices is provided, that the parts may be independently adjusted for timing to prevent undesirable action, and also that the ribbon actuating means may be adjusted through a substantial range to insure correct action of the feed and vibrating means particularly in view of the difference in the major and minor radial dimensions of the cam 230 and the fact that the contour of the cam 230 does not determine the extent of oscillation of shaft 200.

It will also be noted that the parts actuated to form an inked type impression are so motivated by power of springs and of the electric motor as to insure proper timed action of the parts with a good distribution of the several necessary power efforts which greatly reduces shock, vibration and noise incident to operation of the machine.

It will also be noted that the ribbon vibrating means is so constructed and operated that it can be adjusted to permit the use of a bichrome ribbon without danger of any actuated type producing a multi-color print, that the feed and vibrating means can be independently adjusted so as to insure precise action of both means, and that the conditioning of either the ribbon mechanism or the type bar actuating mechanism for proper action does not disturb the proper conditioning of the other one of said mechanisms. Precisely timed action of all parts in forming a perfect inked impression is thus insured.

I claim:

1. In a power typewriting machine of the kind in which type bars are selectively actuated by a type bar actuator which is released for a single power reciprocation thereof from and to a normal stationary position upon selection of a type bar for actuation, and in which the type impressions are inked by a ribbon operated by a ribbon mechanism which is responsive to reciprocation of the actuator, the combination with said type bar actuator and said ribbon operating mechanism of power actuating means for said ribbon operating mechanism controlled by reciprocation of said type bar actuator to motivate said ribbon operating mechanism during only an initial portion of each stroke of the type bar actuator from its normal position and only a final portion of each return stroke of the type bar actuator to its normal position.

2. In a power typewriting machine of the kind in which type bars are selectively actuated by a type bar actuator which is released for a single power reciprocation thereof from and to a normal stationary position upon selection of a type bar for actuation, and in which the type impressions are inked by a ribbon operated by a ribbon mechanism which is responsive to reciprocation of the actuator, the combination with said type bar actuator and said ribbon operating mechanism of a cam rotative through a single revolution upon each cycle of reciprocation of the type bar actuator, an oppositely movable element positively connected with the ribbon operating mechanism to motivate said mechanism upon movement of said element in each direction, spring means for moving said element in one direction, and stop means for arresting spring movement of said element before the type bar ac-

tuator completes its stroke from normal position, said cam being engageable with said element only while the type bar actuator is in and adjacent normal position and being operative on said element to retract it a predetermined extent from its position of arrest by said stop means during the final portion of each revolution of the cam and to hold said element so retracted while the cam and actuator are stationary.

3. In a power typewriting machine of the kind in which type bars are selectively actuative by a type bar actuator which is released for a single power reciprocation thereof from and to a normal stationary position upon selection of a type bar for actuation, and in which the type impressions are inked by a ribbon mechanism which is responsive to reciprocation of the type bar actuator, the combination with said type bar actuator and said ribbon operating mechanism of an oppositely movable element positively connected with said mechanism to motivate the latter, spring means constantly connected with said element to move the element in one direction, means to arrest spring movement of said element before the type bar actuator completes its stroke from normal position, and a normally stationary cam which is normally engaged with said element to hold the latter retracted for a predetermined movement thereof by said spring means and which is positively connected with the type bar actuator for movement of said cam concomitantly with the actuator to effect disengagement of said cam from said element by initial movement of the type bar actuator from normal position and to effect camming re-engagement of said cam with said element to retract said element against the force of said spring means by final movement of the type bar actuator into its normal position.

4. In a visible typing typewriting machine having typing means and a type impression inking ribbon, the combination with said typing means and ribbon of mechanism for feeding and vibrating the ribbon relatively to the printing point of the machine, an oppositely movable and normally stationary actuating element for said mechanism positively connected therewith for motivating the same and constantly biased to move in one direction to a predetermined limit, and power means for releasing said element for biased movement to said limit upon initiation of each typing action of the machine and for thereafter retracting said element to its normal position after a predetermined dwell at said limit and holding said element so retracted until initiation of the next succeeding typing action of the machine.

5. In a typewriting machine of the visible typing class having cyclically operable power typing means for effecting one type impression at a time, the combination with said power means of a ribbon actuator oppositely movable from and to a normal idle position, stop means for limiting movement of said ribbon actuator from its normal idle position, means biasing said ribbon actuator to move from idle position to the limit determined by said stop means, means controlled by each cycle of operation of said power means to first place said ribbon actuator solely under control of said biasing means and stop means throughout a major portion of said cycle and to thereafter retract said actuator to normal position against the power of said biasing means during only a final minor portion of said cycle and hold the actuator so retracted until initiation of the next succeeding cycle of operation of said power means, and means connected with said rib-

bon actuator for operation thereby to vibrate a type impression inking ribbon to cover and uncover the printing point of the machine and to feed the ribbon relatively to the printing point.

6. In a visible typing typewriting machine, the combination of a ribbon actuator oppositely movable from and to a normal idle position, stop means for limiting the throw of said actuator from idle position, means connected with said ribbon actuator to cause an inking ribbon to be shifted edgewise to cover the printing point of the machine upon movement of said ribbon actuator to the limit determined by said stop means and to cause the ribbon to both uncover the printing point and be fed longitudinally upon movement of said actuator to its normal idle position, spring means biasing the ribbon actuator to move from normal position to said limit, type carriers oppositely movable to and from type impressing position, and means for actuating the type carriers selectively to print and for first placing said ribbon actuator under control of said spring means and stop means substantially throughout the printing stroke and at least the initial part of the return stroke of each actuated type carrier and thereafter retracting said ribbon actuator to normal position against the force of said spring means and holding it in normal position until another type carrier is actuated.

7. In a visible typing typewriting machine, power actuated means for forming inked type impressions comprising a ribbon actuator oppositely movable from and to a normal idle position, means connected with said ribbon actuator for movement thereby to vibrate and feed a type impression inking ribbon relatively to the printing point of the machine, spring means biasing said ribbon actuator to move from normal position, type carriers, key-controlled power means for actuating the type carriers selectively to print, means actuative by said key-controlled power means first to free said ribbon actuator to the influence of said spring means upon initiation of each type carrier actuating operation of said key-controlled power means and thereafter to retract said ribbon actuator against the power of said spring means substantially at the conclusion of each such operation and hold it so retracted until the next succeeding operation of the key-controlled power means, and means for arresting movement of said ribbon actuator by said spring means before the actuated type carrier reaches printing position.

8. In a visible typing typewriting machine, power actuated means for forming inked type impressions comprising, in combination, a ribbon actuator oppositely movable from and to a normal retracted position and constantly biased to move from retracted position, means operable by said ribbon actuator to move a type impression inking ribbon edgewise to cover the printing point of the machine upon biased movement of said actuator from retracted position and to uncover said printing point upon movement of said actuator to retracted position, means operable by said actuator to feed said ribbon longitudinally thereof relatively to said printing point, type carriers, cyclically operable power means for actuating the type carriers selectively to print at said printing point, means actuative by said power means during each cycle of operation of the power means to first free said ribbon actuator for biased movement upon initiation of each type carrier actuating operation of said power means and to thereafter retract said ribbon actuator to normal

position and hold it so retracted until the next cycle of operation of the power means, and means independent of said power means for arresting biased movement of said ribbon actuator during each cycle of operation of said power means before the actuated type carrier reaches printing position.

9. In a visible typing typewriting machine, power means for forming inked type impressions comprising, in combination, type carriers oppositely movable from and to normal retracted position to print at a printing point of the machine and each constantly biased to move to retracted position, a type carrier actuator, a ribbon actuator, each of said actuators being oppositely movable from and to a normal retracted position thereof and said actuators being separately biased to move from retracted position, means operable by the ribbon actuator to move an inking ribbon edgewise to cover and uncover the printing point respectively upon the biased and retractive strokes of said ribbon actuator and to feed said ribbon longitudinally thereof relatively to said point on the retractive strokes of said ribbon actuator, a retracting means for both of said actuators which normally releasably holds said actuators retracted for simultaneous release and is also positively connected only with the type carrier actuating one of said actuators to limit biased movement of the latter, means to arrest biased movement of the ribbon actuator before the type carrier actuator completes its limited biased movement, type carrier selecting means for rendering any selected type carrier operable from normal position by the type carrier actuator on the biased stroke of the latter, releasing means for said retracting means operable by said selecting means, a motor driven shaft which rotates constantly while the machine is in use, and means for automatically coupling said retracting means to said shaft as the type carrier actuator completes its limited biased movement to effect retraction of both actuators and for automatically uncoupling said retracting means from the shaft when said actuators are retracted to normal position.

10. In a typewriting machine, power means for forming inked type impressions with the aid of an impression inking ribbon comprising, in combination, type carriers oppositely movable from and to a retracted position to and from the printing point of the machine and each constantly retractively biased, a type carrier actuator, a ribbon actuator for operating the inking ribbon, each of said actuators being oppositely movable from and to a normal retracted position thereof and said actuators being separately biased to move from retracted position, a retracting means for said actuators positively connected only with the type carrier actuator to limit biased movement of the type carrier actuator and normally releasably holding both actuators retracted for simultaneous release of said actuators for biased movement upon release of said retracting means, type carrier selecting means for rendering any selected type carrier operable by the type carrier actuator to print upon biased movement of the type carrier actuator, releasing means for said retracting means operable by said selecting means, adjustable stop means effective only on the ribbon actuator to regulate the period of biased movement of the ribbon actuator relatively to that of the type carrier actuator, a motor driven shaft which rotates constantly while the machine is in use, and means for automatically

coupling said retracting means to said shaft as each biased stroke of the type carrier actuator is completed to effect retraction of the actuators and for automatically uncoupling the retracting means from the shaft when said actuators are retracted to normal position.

11. In a typewriting machine of the kind wherein a pawl is vibrated to rotate a ratchet wheel step by step to drive one or the other of two ribbon winding spools to which a type impression inking ribbon is attached, and wherein provision is made to automatically drivingly connect the ratchet wheel to one spool upon substantial exhaustion therefrom of the ribbon and to concomitantly disconnect the other spool from the ratchet wheel to thereby reverse the direction of travel of the ribbon between the spools, the combination with said pawl and ratchet wheel of a ribbon actuator which is oppositely movable from and to a normal idle position and is also both biased to move from normal position and connected with said pawl to so vibrate the pawl that the pawl drives the ratchet wheel during movement of the actuator to normal position, stop means for arresting biased movement of the actuator, type keys, and power actuated means normally releasably held against movement and releasable by depression of any one of the type keys to move to first disengage said means from said ribbon actuator to free said actuator for full biased movement thereof independently of said means and to thereafter re-engage said means with said actuator to retract the actuator to and hold it in its normal position.

12. In a typewriting machine of the kind wherein a pawl is vibrated to rotate a ratchet wheel step by step to drive one or the other of two ribbon winding spools to which a type impression inking ribbon is attached, and wherein provision is made to automatically drivingly connect the ratchet wheel to one spool upon substantial exhaustion of the ribbon therefrom and to concomitantly disconnect the other spool from the ratchet wheel to thereby reverse the direction of travel of the ribbon between the spools, the combination with said pawl and ratchet wheel of a ribbon actuator which is oppositely movable from and to a normal idle position and is also both biased to move from normal position and connected with said pawl to so vibrate the pawl that the pawl drives the ratchet wheel during movement of the actuator to normal position, a rotative cam for retracting said actuator and which is normally engaged with the actuator to hold the actuator retracted to its normal position, type keys, power means for rotating said cam through a single revolution only upon actuation of either one of said keys and for then holding said cam stationary, and means independent of said cam for controlling the extent of biased movement of actuator from its normal position.

13. In a visible typing typewriting machine, the combination of type keys, type bars, a ribbon actuator conversely movable to shift the same from and back to a normal idle position, means constantly biasing the ribbon actuator to move from idle position, ribbon feeding and vibrating devices operable by the ribbon actuator, a rotative cam for retracting the ribbon actuator to normal position and which is normally engaged with the ribbon actuator to hold said actuator retracted in its normal position, power means for rotating said cam through only a single revolution upon actuation of either of said type keys and for actuating a different one of said type bars

to print for each key actuated, and means independent of said cam for controlling the extent of biased movement of the ribbon actuator from its normal position and arranged to arrest such biased movement before the actuated type bar reaches printing position.

14. In a visible typing typewriting machine having type bars, a type impression inking ribbon and a ribbon vibrator for vibrating said ribbon to cover and uncover the printing point of the machine respectively on the printing and return strokes of the type bars of the machine, the combination with the type bars and ribbon vibrator of an actuator which is conversely movable from and to a normal idle position and is also both biased to move from normal position and connected with said vibrator to vibrate the latter by movement of the actuator from and to the idle position of said actuator, stop means for arresting biased movement of the actuator from normal position, type keys for effecting selective operation of the type bars of the machine, and power means normally releasably held against movement and releasable by actuation of any one of said type keys to move to first disengage from said actuator until a full biased movement of the actuator is completed and to thereafter reengage said actuator and retract it to and hold it in its normal position.

15. In a visible typing typewriting machine having an inking ribbon and a ribbon vibrator for vibrating the ribbon to cover and uncover the printing point respectively on the printing and return strokes of the type carriers of the machine, the combination with the ribbon and its vibrator, of an actuator for the vibrator which is conversely movable from and to a normal idle position and is also both biased to move from normal position and connected with said vibrator to vibrate the latter by movement of the actuator from and to idle position, stop means for arresting biased movement of the actuator from normal position, type keys, power means normally releasably held against movement and releasable by actuation of any one of said type keys to move to first disengage from said actuator until a full biased movement of the actuator is completed and to thereafter re-engage said actuator and retract it to and hold it in its normal position, and type carriers individually selective by said keys for power actuation and each controlled by said power means, upon actuation of its selecting key, to print through the ribbon during the interim between the full biased movement of the actuator and the re-engagement of the power means with said actuator.

16. In a visible typing typewriting machine in which the type print through an inking ribbon, the combination of a ribbon vibrator for said ribbon conversely movable from and to a normal idle position to shift the ribbon edgewise to cause the ribbon to cover and uncover the printing point of the machine, a rotative but normally stationary cam for retracting said vibrator to normal position and normally holding the vibrator so retracted while the cam is stationary, means constantly biasing the vibrator to move from normal position to a position in which it shifts the ribbon to printing point covering position, type keys, type carriers each selective by a different one of said keys for printing actuation, cyclic power means controlled by actuation of any one of said keys for effecting printing and return actuation of the type carrier selected by the actuated key and for effecting a single revolution only of said

cam from the normal stationary position of the cam, and means independent of said power means to arrest biased movement of the vibrator before the selected type carrier reaches printing position, said cam being ineffective on the vibrator during a part of each revolution of the cam while the vibrator is restrained by its said arresting means.

17. In a visible typing typewriting machine in which the type print through an inking ribbon, the combination of a vibrator for the inking ribbon, an actuator connected with said vibrator and conversely movable from and to a normal idle position to shift the vibrator to cause the inking ribbon to cover and uncover the printing point of the machine, type carriers, an actuator for said type carriers conversely movable from and to a normal idle position, cyclic power means for releasing said actuators for biased movement of the actuators and for retracting said actuators to and normally holding them in normal idle position, means biasing the ribbon vibrator actuator to move the ribbon vibrator to position the inking ribbon in printing point covering position, means biasing the type carrier actuator to move to impel a type carrier to printing position, type carrier selecting means for conditioning a selected type carrier for actuation and for effecting a cycle of operation of said power means, and means whereby the ribbon actuator is held stationary during the final part of each biased movement of the type carrier actuator.

18. In a visible typing typewriting machine having an inking ribbon and type carriers which are selectively movable to and from the printing point of the machine to print through said ribbon, the combination with said ribbon and type carriers of a ribbon vibrator which is conversely movable from and to a normal idle position to cause the ribbon to cover and uncover the printing point, a type carrier actuator which is conversely movable from and to a normal idle position, type keys for selecting any desired type carrier for actuation by said actuator, spring means for moving said vibrator in one direction to cause the ribbon to cover the printing point, spring means to move said actuator in one direction to impel a selected type carrier to the printing point, cyclic power means controlled by actuation of any one of said keys for releasing said vibrator and actuator substantially simultaneously and for thereafter automatically retracting the vibrator and actuator and holding them retracted, said power means being arranged to permit arrest of spring movement of said vibrator prior to arrest of spring movement of said actuator and to start retraction of said actuator prior to the start of retraction of said vibrator, and means for arresting spring movement of the vibrator prior to arrest of spring movement of the actuator.

19. In a visible typing typewriting machine having an inking ribbon and type carriers which are selectively movable to and from the printing point of the machine to print through said ribbon, the combination with said ribbon and type carriers of a ribbon vibrator which is conversely movable from and to a normal idle position to cause the ribbon to cover and uncover the printing point, a type carrier actuator which is conversely movable from and to a normal idle position, type keys for selecting any desired type carrier for actuation by said actuator, spring means for moving said vibrator in one direction to cause the ribbon to cover the printing point, spring

means to move said actuator in one direction to impel a selected type carrier to the printing point, and cyclic power means controlled by actuation of any one of said keys to release said vibrator and actuator for movement by their respective spring means and to thereafter automatically retract the vibrator and actuator and hold them retracted, said power means being arranged to permit the vibrator to complete its movement by its said spring means to printing point covering position prior to completion of movement of a type carrier to printing position by the type carrier actuator.

20. A power actuated typewriting machine having, in combination, ribbon motivating mechanism having a biased movement from and a return movement to a normal quiescent position to motivate an inked ribbon to coact with a motivated type to form an inked type impression, means to arrest biased movement of the ribbon motivating mechanism, a cam normally engaged with said mechanism to hold the latter in normal position and having a fixed cycle of movement

from and back to a normal quiescent position, during which movement said cam first disengages from said mechanism to permit the latter to make a full biased movement and thereafter re-engages said mechanism and moves it in opposition to its bias to normal position, power driven means cyclically operable to drive said cam from and to its normal position by each cycle of operation of said power driven means, type carriers movable to and from type impressing position, individual driving means for the type carriers normally out of the field of action of said power driven means and each settable for driving thereof by said power driven means to place its associated type carrier in type impressing position during the interim in which said ribbon mechanism is at the limit of its biased movement and said cam is disengaged from said mechanism, and devices each operable to set a different one of said individual driving means for the type carriers and to concomitantly initiate a cycle of operation of said power driven means.

CHARLES WALKER.