

April 4, 1939.

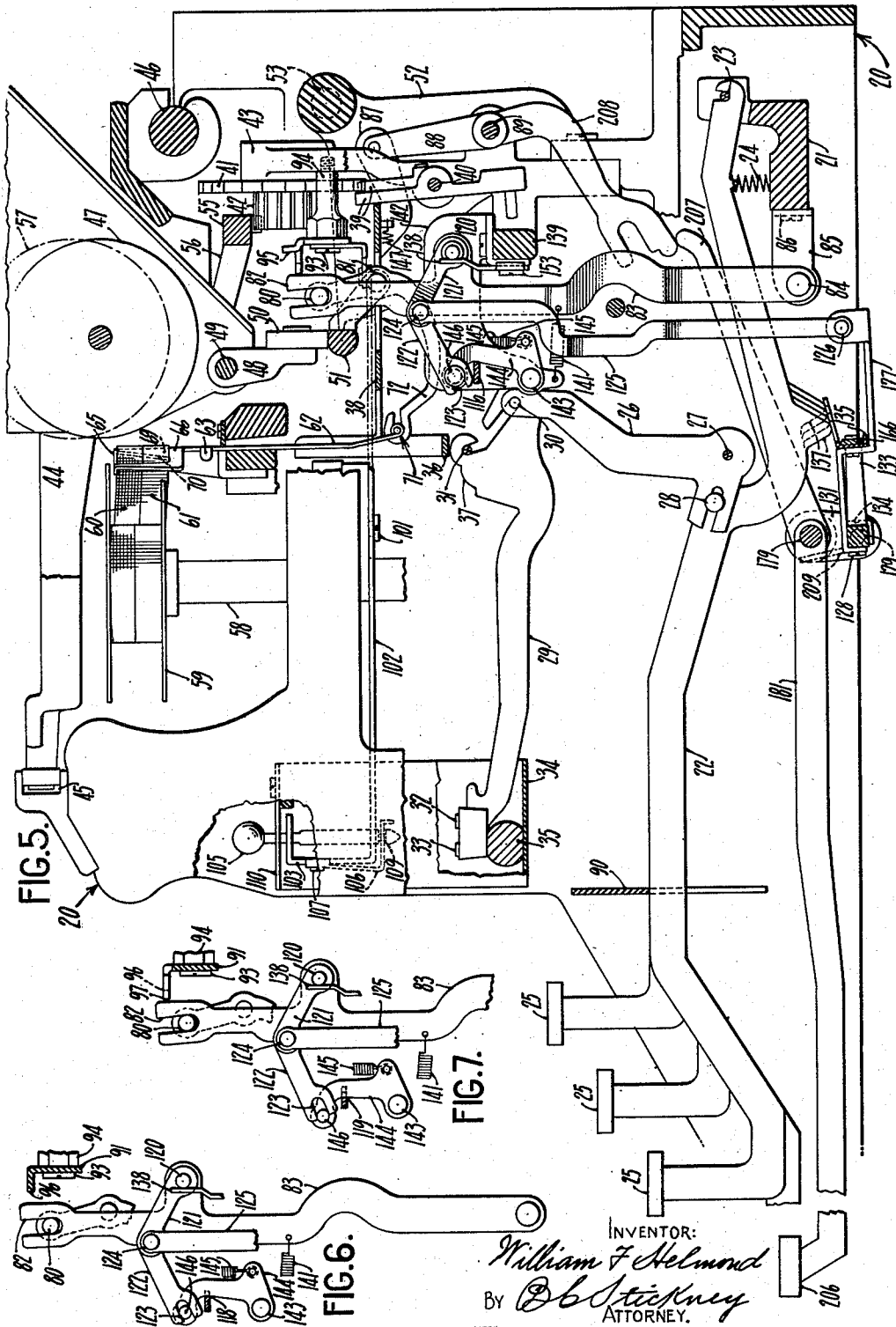
W. F. HELMOND

2,152,848

TYPEWRITING MACHINE

Filed July 17, 1936

5 Sheets-Sheet 2



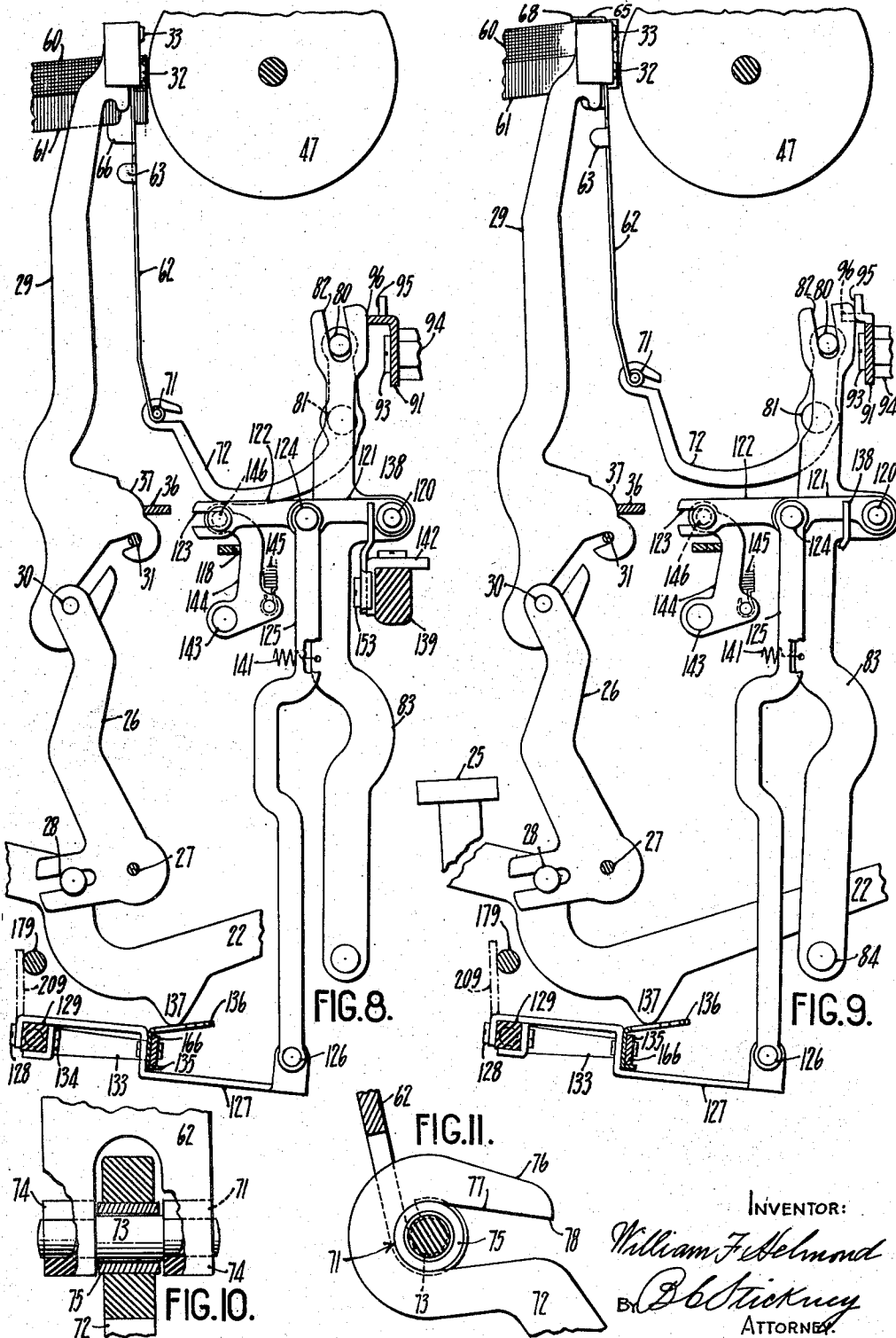
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5 Sheets-Sheet 3



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5 Sheets-Sheet 4

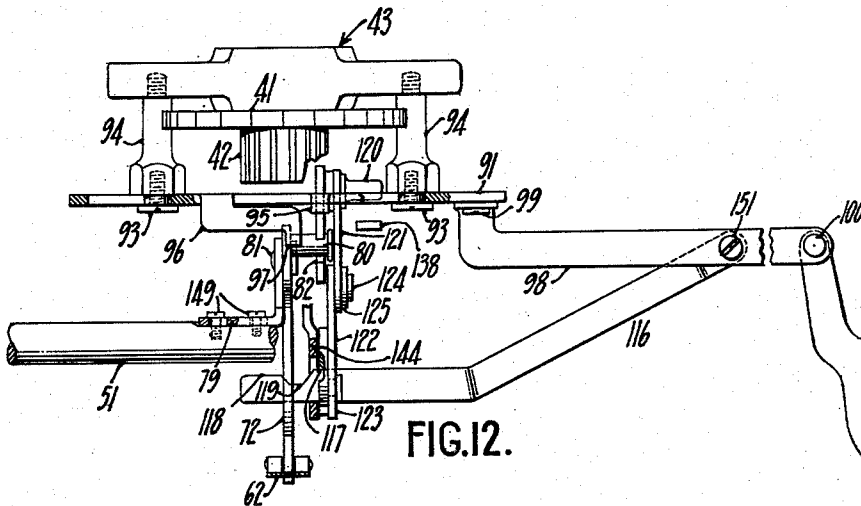


FIG. 12.

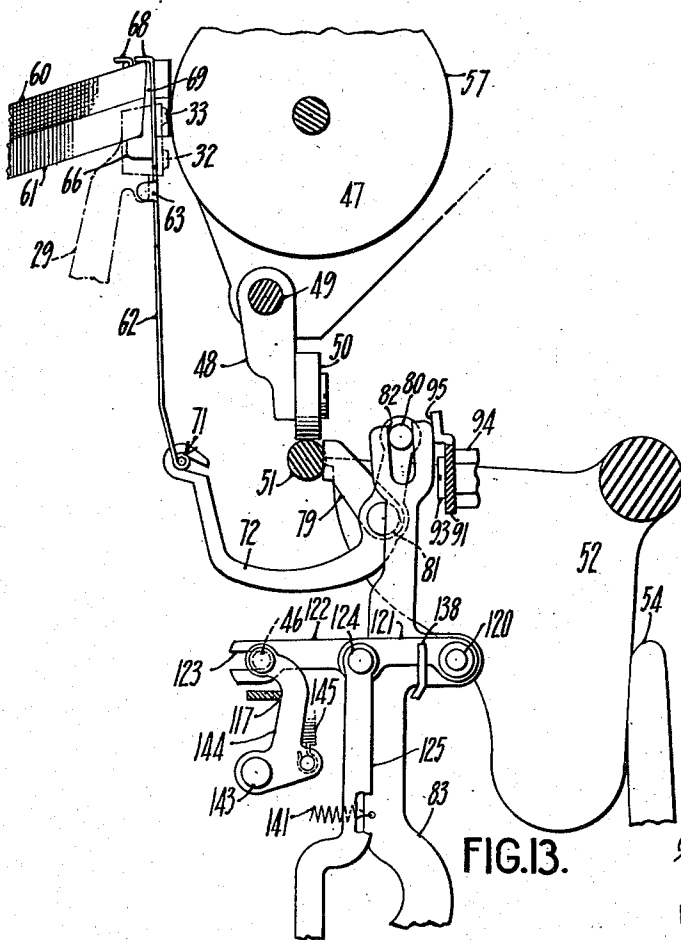


FIG. 13.

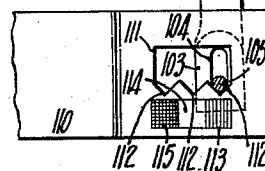
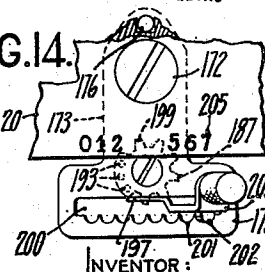


FIG. 14.



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5 Sheets-Sheet 5

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UNITED STATES PATENT OFFICE

2,152,848

TYPEWRITING MACHINE

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Application July 17, 1936, Serial No. 91,020

27 Claims. (Cl. 197—157)

This invention relates to typewriters and more especially to improvements in bichrome-ribbon shifting and vibrating mechanisms, and in finger-key touch-control.

Among the features of the invention are the provision of an improved ribbon-vibrator operating mechanism, actuated by the depression of the key-levers, comprising devices that positively eliminate and eradicate a difficulty heretofore experienced with bichrome typewriter ribbons, namely, the imprinting on work-sheets of characters in part the selected color and in part the other color of a bichrome ribbon or the imprinting of characters only in part, either condition being commonly called "bleeding" in this art.

These positive ribbon-positioning devices include a pivot connection, between the ribbon-vibrator supporting arm and the ribbon-vibrator actuating arm, that can be precisely adjusted to eliminate every bit of lost motion in this pivot connection by eliminating the play heretofore existing in this connection.

These improvements include a positive stop which is easily and positively adjustable whereby the initial height of the ribbon or the initial position of the ribbon with reference to the printing point is precisely predetermined.

The improvements include also a plurality of stops, that prevent overthrow of the ribbon-vibrator, which are simultaneously and selectively positioned in concomitant relationship with a plurality of cam shoulders that selectively determine the lengthwise zone of a bichrome ribbon presented at the printing point on the platen, or a neutral position for stenciling, and which can be positively adjusted. The shoulders may be mounted on a slide arm and be separated by inclined edges to form a composite cam.

The improvements include also an arm which may be positively adjusted to precisely predetermine the throw of the ribbon-guide for either of the bichrome bands, for all of the key-levers, and an adjusting element for each key-lever, to adjust the throw of a bichrome ribbon to either of the bichrome-color positions at the printing point on the platen.

A further improvement is a main ribbon-vibrator-actuating arm of sufficient length that when pivoted at one end and operatively connected at the other end the difference in the throw of the upper end of the arm is minute when moving the ribbon-vibrator to one case position rather than to another, and also another improvement is the provision of an inclined slot in the end of said pivoted arm, the inclination of the slot

being such that the movement of a pin mounted on the ribbon-vibrator arm upwardly or downwardly in said slot substantially counterbalances as closely as desired the different throws of the main actuating arm for different case positions of a bichrome-ribbon vibrator.

Improvements over the ribbon-vibrator shown in my pending application Serial No. 69,130, filed March 16, 1936, involve an integral triangular piece extending upwardly from the obliquely, forwardly, and outwardly extending arm mounted on each fork and integral therewith, to reinforce said metal vibrator and permit of lighter and thinner material and provide two oppositely inclined surfaces that tend to support the ribbon against downward crinkling or slipping when the vibrator is moved upwardly.

Further improvements are touch-control devices interengaging with the ribbon-vibrator universal bar and comprising a coil-spring mounted on the spacer-bar rulerum-bracket and a finger-piece accessible on the outside of the typewriter to vary the spring tension resistance to downward movement of the universal bar when intercepted by the key-levers.

Another improvement is an adjustable overthrow stop-arm mounted on the rock-shaft that mounts the ribbon-vibrator universal bar, which engages the spacer-bar rock-shaft to check downward movement of the universal bar at a predetermined point.

Other features and advantages will hereinafter appear.

In the accompanying drawings,

Figure 1 is a perspective view showing the improvements and related parts of a typewriter.

Figure 2 shows the parts of the ribbon-vibrator arm just prior to assembly, the assembled position being indicated in dot-and-dash lines.

Figure 3 is a perspective view, partly in section, showing the spring-detent arm of the adjustable sector-arm for varying the tension of the universal-bar tension spring in engagement with one of the detent-notches.

Figure 4 is a plan view, partly in section, showing the notched sector engaged by the tension-varying pinion and the sector-adjusting arm in the last or zero position.

Figure 5 is a side elevation, parts in section and parts broken away.

Figure 6 is a side elevation of the main actuating arm, the toggle and overthrow stop being set for the black band of the ribbon in inoperative position, and the link connecting with the universal bar being broken away.

Figure 7 is a view similar to that of Figure 6 but with the parts in the stenciling position.

Figure 8 is a side elevation showing a key depressed and a type engaging the upper zone of the bichrome ribbon.

Figure 9 is a side elevation similar to Figure 8 but with a type engaging the lower (red) zone of a bichrome ribbon.

Figure 10 is a vertical section showing a fixed bearing connecting the ribbon vibrator arm and the actuating arm.

Figure 11 is a side view of the parts shown in Figure 10.

Figure 12 is a plan view showing the cam shoulders set to present the lower band (red) of a bichrome ribbon at the printing point.

Figure 13 is a side elevation showing the parts set to present the lower band (red) of a bichrome ribbon at the printing point with the main vibrator actuating arm in engagement with the over-throw stop.

Figure 14 is a side elevation showing the finger-actuating piece for adjusting the touch-control spring of the universal bar set under "7" on the index-scale, which is the maximum tension adjustment of the spring.

Figure 15 is a plan view of a modification of a color index and of the related cam shoulders, with the parts set to present the lower band (red) of a bichrome ribbon at the printing point.

Figure 16 is a side elevation similar to Figure 7 but of a modified toggle in which the slotted arm is lengthened so that the toggle in the extreme operative position is in a position less than that of a straight angle, the arm connecting with the universal bar being shown bent upwardly.

Figure 17 is a front elevation with parts in section showing the mounting of the shaft for the touch-control tension spring, the tension-varying pinion, and the control arm.

As shown in Figure 5, a typewriter frame 20 supports at the lower rear end a cross-bar 21 on which the rear ends of key-levers 22 are pivoted by a pivot rod 23 extending along the cross-bar 21. A coil spring 24 resiliently engages the under side of each key-lever 22 and the upper surface of the cross-bar 21, thereby tending to hold the key-levers 22 in their uppermost position in a comb 30. There are four banks of key-levers 22 with the lowermost of the keys 25 being broken away as shown in Figure 5. Adjacent each key-lever 22 is a link 26 pivoted on a transverse pivot rod 27 and actuated to tilt forwardly or backwardly by a pin-and-slot connection 28 with the adjacent key-lever 22. Each type-bar 29 has at its rear or lower end a pin-and-slot connection 30 with the upper end of the link 26 whereby, when any key 25 is depressed, the corresponding type-bar 29 is swung on the segment rod 31 as a fulcrum, so that lower-case type 32 or upper-case type 33 are swung upwardly to the printing point on a platen 47, which is mounted for shifting to the upper-case position 57, by means herein-after shown and described. A segment rest 34 encases a segmental cushion 35 on which the heads of the type-bars 29 recline. An escapement universal bar 36 is engaged and actuated by a cam-surface 37 on each of the type-bars 29 and has a rearward extension 38, which has at the rear rearwardly extending arms 87 which have pivotal connection with the upper ends of arms 88 which are supported on a rock-shaft 89 on the frame 43. Rearward thrusts of the universal bar extension 38 rock the escapement stops 39 on the pivot 40 to allow the ratchet wheel 41 to turn to-

gether with an interlocked pinion 42 on which lies a carriage-rack 55 which is mounted on arms 56 depending from a carriage 44 which is thereby permitted to advance in letter-space movement, as is well-known in the art.

The carriage 44 is mounted for reciprocatory movement on a track 45, supported on the typewriter frame 20 at the front and on a rail 46, mounted on the frame 20 at the rear. Depending feet 48, which are pivotally mounted on a rod 49, carry at their lower extremities rolls 50 which support the platen 47 on a case-shift rail 51, which is supported on a case-shift frame 52, the latter having pivotal mountings 53 at each end in the frame 20 of the machine and being raised by a usual shift lever connected with a key on the front of the machine as is well-known in the art. A rack 55 travels on the pinion 42 and is supported from the carriage 44 by arms 56. Vertical ribbon-feed shafts 58 support ribbon spools 59.

The ribbon comprises two lengthwise bands or zones, an upper black zone 60 and a lower red zone 61, and therefore is now called in the art, a "bichrome" ribbon. As is shown in Figure 5, the top of the ribbon normally lies below the printing point in the guide of a ribbon-vibrator 62, and as a type-key 25 is depressed the vibrator 62 is raised to interpose either zone of the bichrome ribbon between type 32, 33 and the platen 47. The ribbon-vibrator 62 is forked at the upper end, each fork carrying a forwardly projecting guide 63 for precisely positioning the ribbon-vibrator in its vertically reciprocating movement. The upper end of each fork is an upwardly projecting flat piece 64 which forms the supporting stem of each of two symmetrical parts of the ribbon guide of the vibrator 62. The upwardly projecting flat pieces 64 terminate at the top in integral horizontally, outwardly, and forwardly extending top pieces 65, which act as stops against the upper edge of the ribbon and prevent it from rising on the guides, the form of the top pieces 65 at right angles to the vertical flat pieces 64 and their construction of thin sheet metal allowing an initial setting of the vibrator very close to the printing point without affecting the visibility of the line of printing, and so permitting a minimum of throw or motion in raising the ribbon from the inoperative to the printing position. Projecting outwardly, forwardly, obliquely, and horizontally from the pieces 64, integral arms 66 provide supports and guides for the lower edge of the ribbon, and at their outer extremities support uprights 67 which terminate at the top in inwardly and horizontally turned stops 68 which lie in the same horizontal plane as the top-pieces 65 and also act as stops to prevent upward rising of the ribbon. Pieces 65 and stops 68 are separated to provide a slot for the insertion of the ribbon in the guide transversely to the normal path of movement of the ribbon. Formed integral with the outer edge of each of the upright pieces 64 and the adjacent arm 66 is a triangular reinforcing piece 69 having an obliquely inclined ribbon-guiding and sustaining edge 70, said edge tending to prevent crinkling of the ribbon or its downward slipping. The triangular reinforcing piece 69 tends to keep the guides from bending and permits lightening the weight of the vibrator by permitting the use of thinner material or metal than formerly. As compared with a former ribbon-vibrator which fully exposes the line of printing when the vibrator is down in the inoperative position, the top edge of the ribbon in the present ribbon-vibrator guide may be raised .033 inch and still

give the same visibility at the printing point, or in other words the throw of the ribbon in lower-case printing position is lessened by .033 inch.

The ribbon-vibrator 62 has a rearwardly bent lower end to provide space for a pivotal connection 71 with an arcuate horizontally positioned actuating arm 72 on which it is mounted for vertical reciprocation, or vibration. Figure 2 shows the parts of the connection 71 prior to the assembly and Figures 10 and 11 show front and side views of the operative assembly. A fulcrum pin 73 is secured in supporting ears 74, which are formed by forking the lower end of the vibrator 62 and by curling the forked ends back upon themselves, and a bit of solder may be used fixedly to secure the fulcrum pin 73 in the ears 74. A bearing collar or gasket 75 surrounds the fulcrum pin 73 and overlies an enlarged central cylindrical portion of the fulcrum-pin 73, the ends of which, where they join the smaller cylindrical ends, form stops for the inner edges of ears 74, and is provided with sufficient play between its ends and the ears 74 that the bearing collar 75 may turn freely therebetween without binding thereon. After the fulcrum-pin 73 is inserted under a hook 76 into a slot 77, as indicated in Figure 2, the hook 76 is bent down to the position shown in Figure 11 by special pliers which leave the throat 78 of the slot 77 in such a form that no play of the collar or gasket 75 can take place away from the circular bottom of the slot 77. The ribbon-vibrator 62 is definitely and permanently located for pivotal movement with reference to the slot in the end of the vibrator-actuating arm 72. The bending of the hook 76 to constrict the throat of the slot 77 avoids all play, which has existed in a former construction, between the gasketed fulcrum-pin 73 and the end of the actuating arm 72 so that when the ribbon is thrown there can be no variation in the motion imparted to the ribbon by the arm 72 due to play between the arm 72 and the vibrator 62. As shown in Figures 1 and 12 a bracket 79 may be secured on the inner side of shift rail 51 for lengthwise adjustment thereon by means of screws 149 passing through horizontal slots in the bracket 79. This horizontal adjustment of the bracket 79 provides means for compensating for variations in the position of the shift-rail 51. The bracket 79 has a right-angular rearward and downwardly inclined extension on which is supported a transverse pivot-pin 81 on which the actuating arm 72 is mounted to rock as a fulcrum. Supported on the rear upper end of the arm 72 and extending transversely therefrom to the right is a cylindrical pin 80 which closely and slidably fits in an inclined slot 82 the walls of which are formed by the bifurcation of the upper end of an arm 83 and are in parallel and incline forwardly at the top at a predetermined angle selected to compensate for, or to predetermine desired variations in the throw of the ribbon between lower-case and upper-case positions.

The main actuating arm 83 is mounted for forward and rearward oscillatory movement on a pivot-screw 84 carried in the forward extension of a bracket 85 secured by screws 86 to the frame 20 of the machine. It is now obvious that this oscillatory movement of the arm 83 forwardly and rearwardly rocks the actuating arm 72 up and down to raise and lower the ribbon-vibrator 62 and to interpose the ribbon between the type 32, 33 and the printing point on the platen 47.

To provide overthrow stops for the main actuating arm 83, a slide-arm 91 is provided with two centrally positioned, horizontally elongated slots

92. The screws 93 mounted on the bolts 94 screwed into the frame 43 slidably mount the arm 91 by means of the slots 92. Between the slots 92 on the slide arm 91 are mounted three ribbon-overthrow stops, 95, 96, and 97, each positively bendable to adjust its position with reference to the upper inner edge of the arm 83, as shown in Figures 1, 5, 6, 7, 8, 9, and 12, the 95 stop being for red, the 96 stop being for black, and the 97 stop being for the stenciling position. Care must be taken not to bend any of the stops too much to result in preventing complete action of the type-bars. In fact, a close adjustment should be resorted to only in extreme cases, for example, to adjust the ribbon-vibrator for the uniformly heavy touch of certain operators.

A horizontally disposed link 98 has an upturned left end which is pivoted by means of a screw 99 to the right end of the slide arm 91. A forwardly projecting lever-arm 102 swings laterally on a pivot 101 as a fulcrum and is pivotally connected at its rear end with a screw 100 so that a leftward movement of the forward end of the arm 102 causes a rightward movement of the slide arm 91 and the overthrow stops 95, 96, and 97, and vice versa. The forward end of the lever-arm 102, as shown in Figures 1 and 5 is bent upwardly at right angles and then backwardly at right angles to form the upper flat piece 103 having a rearwardly projecting slot 104 centrally positioned therein, which permits an operating finger 105 to swing rearwardly therein. The lower end of the finger 105 passes through an aperture in the arm 102 so that a lateral thrust on the finger 105 swings the lever 102 laterally. In repairing or adjusting a typewriter it is sometimes convenient to remove the finger 105 wherefore the lower end is provided with a right-angled bent spring 106 secured by a screw 107 to the upper front extension of the arm 102 and having a slotted end 108 parallel with the arm 102 and underneath it for engaging an annular groove 109 in the handle 105 detachably to secure it in operative position. A plate 110, also clearly shown in Figure 12, is provided with an opening 111 having a maximum front-to-rear dimension co-extensive with that of the slot 104, and the front edge thereof is provided with three notches 112, one adjacent an index field on the plate 110 corresponding to the setting of each of the overthrow stops, 95, 96, and 97, a red field 113, a white field 114 (for stenciling), and a black field 115.

An arm 116, pivotally connected by a screw 151 to the arm 98, extends obliquely, forwardly and to the left and is bent to extend parallel with the arm 98. It is clear therefore that as the arm 98 slides to the right or left the arm 116 also slides synchronously and co-extensively, as shown in Figures 1 and 12, to present shoulders 117, 118, and 119, the inner edge 117 causing the greatest throw of the vibrator 62 and thereby presenting the red zone 61 of the ribbon at the printing point, the edge 118 causing the black zone 60 of the ribbon to be presented at the printing point, and the edge 119 permitting the ribbon to remain below the printing point, all as will be more particularly hereinafter set forth. Any desired arrangement of the fields 113, 114, and 115 may be selected, in which case the overthrow stops, 95, 96, and 97, and the shoulders 117, 118 and 119 are rearranged to correspond therewith.

The mechanism controlled by the shoulders 117, 118, and 119, for actuating the arm 83 to 75

throw the ribbon up into printing position is now described. A transverse pin 120, mounted on an upper rearward extension of the arm 83, projects horizontally to the right and adjacent its mounting the right end of a toggle arm 121 is pivotally mounted thereon to swing in a plane that parallels a side of the arm 83. The other arm 122 of the toggle is provided with an end slot 123. A pin 124 pivotally links the toggle arms 121, 122 and the depending link 125 so that the raising and lowering of the link 125 breaks the toggle and actuates the toggle, respectively. The lower extremity of the link 125 is pivotally secured by a pivot screw 126 to an upturned ear on the rear end of a rearwardly extending arm 127, which has an intermediate upward right-angled bend and a forward right-angled bend which provides a corner to overlie the top and the front face of a square-shaped rock-shaft 129 to which it is secured by a screw 128. The rearward portion of the arm 127 is bendable upwardly or downwardly to determine the initial position of the link 125. The rock-shaft 129 rocks on an adjustable pivot screw 130 which is mounted on arm 131 which depends from a stub-shaft 132 at the left mounted in the frame of the machine, and at the right end on a pivot screw 135 mounted on a plate 174 depending from the spacer-bar fulcrum bracket 170. It is now evident that the bracket-arm 127 swings on a fulcrum that coincides with the central axis of the rock-shaft 129. Near either end of the rock-shaft 129 a rearwardly projecting bracket-arm 133 is mounted thereon by means of a U-shaped end adapted to fit over the arm 129 to which it is affixed by screws 134. The bracket-arms 133 support on their rear extremities, together with the bracket-arm 127, a universal bar 135 which is reinforced by a bar 166 and is provided with bendable upwardly and rearwardly extending tongues 136 divided into four groups of different length, each group underlying and being intercepted by a camming downward projection 137 from the bottom of the key-lever 22 connected with the corresponding horizontal row of keys 25. The pin 120 extends to the right of the toggle a sufficient extent to provide a long contact edge in parallel with the flat rear wall of a bendable stop-arm 138, which is fastened by a screw 153 over a depending foot of a bracket 142 to the front wall of an arm 139. A coil-spring 190 has an extension 191 which tends to lift the universal bar 135 and the tongues 136 into engagement with the projections 137 on the key-levers 22 and to raise the actuating link 125 to break the toggle 121, 122. A coil-spring 141 is fastened to the arm 83 and to the forward and downward extension of the bracket 142 and tends to move the arm 83 forward, to bring the pin 120 forward into engagement with the stop 138, and to lift or break the toggle 121, 122. A fastening screw 143 pivotally mounts an arm 144 on the right side of the forward and downward extension of the bracket 142. A spring 145 secured to a rearward extension of the arm 144 and to the bracket 142 tends to swing the arm 144 upwardly and forwardly about a pivot-screw 143. A pin 146 is horizontally mounted on the top of the arm 144 and normally lies within the toggle slot 123. It is now clear that the springs 145 and 141, the latter tying the front end of the bracket 142 and the main actuating arm 83, resiliently hold the front edge of the arm 144 in engagement with the rear edge of the arm 116 in three separate and distinctive forward-rearward positions depending upon which of the three cam shoulders 117, 118, 119

engages the forward end of the arm 144, and holds the pin 120 in engagement with the stop 138. As the arm 116 moves transversely to change the position of the arm 144 the front edge of which is in resilient engagement with the rear edge of said arm 116, inclined edges separate the shoulder 117 from the shoulder 119 and the shoulder 118 from the shoulder 119, so that the front edge of the arm 144 slides gently back or is pushed easily forward by the inclined edge to the next position. Thus, the adjacent shoulders 117, 118, 119, being connected by inclined portions, may be regarded as a composite cam which, upon being moved laterally of the arm 144, moves or cams the said arm to the desired setting. The relative positions of the parts and their proportions are such that the upward movement of any of the tongues 136 in engagement with a projection 137 on a key-lever 22 is stopped by the comb 90 (Figure 5) which concomitantly predetermines the initial rest position of the toggle pivot-pin 124 and limits the movement of the arm 122 to withdraw the slot 123 away from the pin 146 to the extreme position shown in Figure 7. The position of the stop 138 positively determines the beginning of actuating motion by the arm 83 and consequently the initial position of the top of the ribbon below the printing line of the platen. The rear part of arm 127 is bendable up or down to vary the extent of the downward motion of the actuating link 125 and consequently the throw of the ribbon for either red or black is easily varied. The tongues 136 are bendable individually to coordinate the motion of each key lever and associated type action, with the ribbon vibrating mechanism. Since the toggle pivot 124 is preferably moved in a constantly uniform extent of motion, it is therefore preferred that the link 125, in actuating the toggle, be moved correspondingly in a uniform extent of motion, so that the respective links, 121, 122, always assume substantially the same initial position and are always actuated to a substantially straight condition.

The improvements involve a long actuating arm 83 pivoted at its lower end so that the change in leverage effected by raising the pin 80 in the slot 82 as the platen is shifted from lower-case to upper-case position is a very minute proportion of the whole leverage so that the change in throw of the ribbon in upper-case position is very small, but this change, slight as it is, may be exactly and precisely compensated for by the provision of a forwardly and upwardly inclined slot 82 in which the transverse pin 80 exactly fits, or the throw may be changed within the limits of the construction disclosed by increasing or by decreasing the inclination of the walls of the slot 82.

The movement of the arm 83 is effected by the toggle 122, 121 and the initial starting point for ribbon-throw is determined by the engagement of pin 120, transversely on arm 83, and the adjustable stop 138. The top of the ribbon may therefore be precisely positioned with reference to the printing point by bending the stop 138 forwardly or rearwardly, the stop 138 being made of bendable material for facile but for precise adjustment in this manner.

In using a bichrome ribbon three different ribbon positions are required, namely, the usual black-zone position, the red-zone position, and the neutral position, and so three different conditions are involved in the ribbon-vibrating mechanism, two different throwing motions and one in which there is no throwing motion. The

pin 120 fast on the arm 83 moves the arm 83 to the right as the toggle is actuated by depressing the link 125, the movement of depression being directly related to that of universal bar 135 so that in order to vary the motion of the toggle between its extremities the arm 116 is slidable across the front of the end of the toggle to present differently spaced surfaces 117, 118, 119 which in conjunction with the pivoted arm 144 variously position a transverse pin 146 with reference to the bottom of slot 123 in the end of the toggle to provide a slidingly variable pivotal connection for the left end of the toggle. In effect the pin 146 and slot 123 constitute a lost-motion device for the toggle, the limits of lost motion or ineffective motion being variable by selectively setting the pin 146 in relation to the end of the slot 123. The pivoted arm 144 is yieldably retained against one of the shoulders 117, 118, 119, on arm 116, movement of which sets the position of the pin 146, and so varies the effective length of the toggle 121, 122, to move the arm 83 to the right through different motions, or not at all in a neutral position, and consequently to raise the ribbon to different positions or not at all for the stenciling position. It is also clear that if the link 125 be depressed less than the full down stroke the throw of the ribbon is reduced so that by bending up the bracket arm 127 supported by the universal bar 135 the throw of the ribbon is decreased slightly, as illustrated in Figure 16. It is also to be noted that the downward stroke of any key-lever 22 is positively terminated by the contact of a type 32, 33 with the platen 47.

Mounted for synchronous and concomitant sliding action with the stops 117, 118, and 119 are overthrow stops 95, 96, and 97, for the red, black and neutral positions, respectively, in the order named, for a bichrome ribbon. These overthrow stops check the motion of the ribbon-vibrating mechanism.

The stops 95, 96, and 97 may be bent to provide a precise adjustment of the overthrow stops. To prevent choking of the type-bars care must be taken not to bend the stops too closely.

The pivotal connection 71 between the vibrator-supporting arm 62 and the vibrator-actuating arm 72 has heretofore included a slot having parallel walls, the possible play in which has permitted inaccurate or varied throw of the ribbon. The present connection 71 makes the orifice 78 of the slot smaller, eliminates this play by means of the inclination of the walls of the orifice toward each other, and provides for a precise adjustment. A special closing tool is used in adjusting the orifice 78 and care is taken to prevent crushing the gasket or collar 75 on the fulcrum-pin 73.

The triangular reinforcing pieces 69 in the guide of the ribbon vibrator provide opposed inclined guide surfaces 70 for the ribbon which prevent crinkling of the ribbon and tend to check downward slipping of the ribbon while the vibrator is being thrown, and the reinforcing of the parts of the vibrator-guide with reference to each other permits of thinner and therefore lighter construction of the vibrator-guide.

A modification is shown in Figure 15 in which the finger-piece 105 is set at the left notch 112 opposite a red index field 160. A black index field 161 is at the center and a stencil field 162 at the right. The cam-edges on the end of the arm 116 are in different sequence, the red cam-edge 157 at the end of the arm 116, the black cam-edge

158 next to the right, and the stencil cam 159, non-effective to throw the ribbon vibrator 62 at the right. The black cam-edge 158 is separated from the adjacent cam-edges 157, 159 by smooth inclines as is the case with the form shown in Figure 12. If desired the finger-piece 105 may be movable normally only from the red field index 160 to the black field index 161, and vice versa, the operation of a latch or other device being required for the unusual stencil index field 162. The overthrow stops on the slide arm 98 are also rearranged as compared with the form shown in Figure 12, as follows, the overthrow stop for red, 163, at the left, the overthrow stop for black, 164, next to the right, and at the extreme right the overthrow stop for stenciling, 165.

A modification is shown in Figure 16 in which the left arm 167 is made a bit longer than the arm 122 shown in Figure 9 so that the toggle does not open into a straight angle as shown in Figure 9, but instead when the downward movement of the link 125 is stopped by the engagement of type 32, 33 with the platen 47 or by the engagement of the upper end of the arm 83 with the overthrow stop 163, the toggle in the extreme downward movement of the link 125 forms an obtuse angle less than a straight angle so that the return movement of the ribbon-vibrator 62 is made more rapid. This position requires a slight upbending of the rear extension of the bracket-arm 127. To procure this result an arm 167 is substituted for the arm 122 in the toggle which is a bit longer, or the cam-edges 117, 118, 119, or 157, 158, 159 are set a bit further to the rear.

A spacer bar 206 (see Fig. 5) is mounted by the usual arms 181 on a rock-shaft 179 so that as bar 206 is depressed a rearwardly and upwardly extending arm 207 is raised and actuates a downwardly and forwardly extending arm 208 mounted on the rock-shaft 89 so that it moves the escapement universal bar 36 rearwardly to letter-space the typewriter.

Fast on the rock-shaft 129 which rotatably supports the universal bar 135 may be positioned a stop-arm 209 (see Figures 17, 8, 9) having a lower right-angled bend to interengage the bottom wall of the rock-shaft 129, the stop-arm 209 being secured thereto by the fastening screw 210. This stop-arm 209 swings toward the rock-shaft 179 as the universal bar 135 is depressed and engages the rock-shaft 179 in the extreme downward position of the universal bar 135. The stop-arm 209 may be bent or flexed for adjustment.

An improved touch-control mechanism is shown in Figures 1, 3, 4, 14 and 17. A spacer-bar fulcrum-bracket 170 has an axially projecting tapped stub-shaft 171 which engages a headed screw 172, the latter two parts lying in a horizontal bore in the frame 20 and a lug 178 projecting inwardly therefrom, and the bracket 170 also has an outer vertically depending plate 173 and an inner vertically depending plate 174. Brazing may be used. A vertical groove 175 in the inner end of lug 178 interengages a locking pin 176 to secure the plates 173 and 174 in a vertical position. A collar 177 is axially mounted on the right end of bracket-shaft 170 and supports the stub 171 as well as spacing the bracket 170 from the frame-lug 178. The spacer-bar rock-shaft 179 has a fulcrum-pin which engages an axial socket 180 and also supports the forwardly extending spacer-bar-supporting arm 181, by means of screws 182. A tension spring 183 is mounted on the end of the rock-shaft 179 and has one end hooked under the arm 181, thereby tending to

hold it in the upper position, and the other end engaging a nut 184, which is mounted on a right end pivot-screw 185 and serves to lock the screw adjustably in the inner bracket-plate 174.

5 A tension pinion-shaft 186 has an axial tapped bore at the left end for engaging a pivot-screw 185, the right end of the shaft 186 having a bearing in the plate 173 and a screw-groove for a screw-driver to tighten the shaft 186 on the
10 screw 185. A tension pinion 187 is secured on a collar 188, both being rotatable as a unit on the shaft 186 and fixed against rightward movement on the shaft by an annular collar 212. An inner spacing collar 189 is rotatably mounted on
15 the shaft 186 and engages the inner coil of a tension spring 190 which has a tangential rearward extension 191 which rests against a notch in a downward extension of an arm 133. It may be here noted that the extension 191 and the arm
20 133, which latter supports the universal bar 135, swing about the same axis so that there is no radial sliding movement of the spring extension 191. The other or outer end 192 of the coil spring
25 190 is turned axially outwards and engages one of three radially spaced holes 193 in the tension pinion 187 which furnish a variable primary adjustment of the rotatable tension pinion 187. The inner vertical plate 174 has a lower inward horizontal extension 194 on which is pivotally mounted
30 the inner end of a touch-control tension lever 195, which may be formed of thin spring steel, by means of a pivot screw 196. The intermediate portion of the tension-lever 195 is bent up to form a widened, raised sector 197, in which are spaced-apart recesses 198 which intermesh with
35 teeth 199 on the pinion 187. It is now clear that as the sector 197 moves to the right the tension pinion 187 turns to tighten the coil spring 190, and vice versa. The outer end of the lever arm
40 195 passes through and is movable through a predetermined arc in a horizontal slot 200 formed in the lower portion on the inner depending plate 173. A ratchet 201 formed in the lower wall of the slot 200 resiliently engages a stud 202 centrally fixed on the bottom of lever 195. An outer
45 vertical extension 203 of the lever 195 supports a knurled handle or finger-piece 204 accessible exteriorly of the typewriter below the frame 20. An index scale 205 on the outer wall of the frame
50 20 provides for eight positions of the tension lever 195, a notch in the ratchet 201 corresponding to each position. There are also three primary positions determined by the setting of the end 192 of the coil spring 190 in the holes 193 of the tension pinion 187.

55 Between zero position and "7" position, there is an increase of tension on the key-levers 22 of approximately 45%. Individual key-lever springs 24 may be lightened initially to offset the touch-control spring. A slight lifting of the lever 195 or finger-piece 204 eases the action. The contact of the key-levers 22 with the universal bar tongues 136 is arranged to effect a uniform tension adjustment for the different length of key-levers.

65 Variations may be resorted to within the scope of the invention, and portions of the improvements may be used without others.

Having thus described my invention, I claim:

70 1. In a typewriter, in combination, a case-shift platen, a ribbon-vibrator mounted to position different color zones of a bichrome ribbon at the printing point of a platen in either upper-case or lower-case position, an arm for supporting said vibrator, an actuating arm pivotally mounted on
75 a case-shiftable element for throwing said sup-

porting arm, a tight pivotal connection between said arms, a transverse actuating pin mounted in the end of said actuating arm, a vertically positioned arm having an inclined slot at the upper end for engaging said transverse pin in either
5 case position, a toggle pivotally connected with said vertically positioned arm, an adjustable stop for varying the initial position of the vertical arm, a slot in the other end of said toggle, a pivoted arm having a transverse pin engaging
10 said toggle slot, an adjustable arm having a cam for positioning said last-named arm and said transverse pin in a plurality of adjusted positions to determine the throw of said vertical arm, a link for actuating said toggle mounted on an arm
15 extending from the universal bar, said arm being positively adjustable to vary the throw of said vertical arm, and key-levers mounted to actuate said universal bar.

2. In a typewriter, in combination, a ribbon
20 vibrator, an arm for supporting said vibrator, a pivotally mounted actuating arm pivotally connected with said supporting arm, an actuating pin mounted on an end of said actuating arm, a pivotally mounted arm having a sliding connection with said pin, a toggle having one link piv-
25 otally connected with said sliding-connection arm, a pivotal connection for the other link of said toggle, a key-actuated universal bar, and a link connecting said toggle and said universal bar, whereby the ribbon vibrator is moved to the
30 operative position when any key-lever is depressed.

3. In a typewriter, in combination, a ribbon
35 vibrator, an arm for supporting said vibrator, a pivotally mounted actuating arm pivotally connected with said supporting arm, an actuating pin mounted on an end of said actuating arm, a pivotally mounted arm having a sliding connection with said pin, a toggle having one link piv-
40 otally connected with said sliding-connection arm, a slidably variable pivotal connection for the other link of said toggle, a key-actuated universal bar, and a link connecting said toggle and said universal bar, whereby the ribbon vibrator is
45 moved to the operative position when any key-lever is depressed.

4. In a typewriter, in combination, a ribbon
50 vibrator, an arm for supporting said vibrator, a pivotally mounted actuating arm pivotally connected with said supporting arm, an actuating pin mounted on an end of said actuating arm, a pivotally mounted arm having a sliding connection with said pin, a toggle having one link piv-
55 otally connected with said sliding-connection arm, a pivoted arm having a sliding connection with the other link of said toggle, a plurality of stops for selectively engaging said pivoted arm, a key-actuated universal bar, and a link connect-
60 ing said toggle and said universal bar, whereby the ribbon vibrator is moved to a plurality of operative positions to present different zones of a multicolor ribbon at the printing point or a neutral zone.

5. In a typewriter, in combination, a ribbon
65 vibrator, an arm for supporting said vibrator, a pivotally mounted actuating arm pivotally connected with said supporting arm, an actuating pin mounted on an end of said actuating arm, a pivotally mounted arm having a sliding con-
70 nection with said pin, a toggle having one link pivotally connected with said sliding-connection arm, a pivotal connection for the other link of said toggle, a key-actuated universal bar, an arm mounted thereon, and a link connecting said
75

toggle and said universal-bar arm whereby the ribbon vibrator is moved to the operative position when any key-lever is depressed, said universal-bar arm being positively adjustable to vary the throw of the ribbon vibrator.

6. In a typewriter, in combination, a ribbon vibrator, an arm for supporting said vibrator, and a pivotally mounted actuating arm having a pivotal connection with said supporting arm, said connection including a bifurcation on the end of one arm, a fulcrum pin having its ends mounted in the ends of said bifurcation, a collar on said fulcrum pin, and a hook on the end of the other arm, said hook having an open throat to admit said collar and constricted to grip the collar in fixed position therein.

7. In a typewriter, in combination, a ribbon vibrator, an arm for supporting said vibrator, and a pivotally mounted actuating arm having a pivotal connection with said supporting arm, said connection including a bifurcation on the end of the supporting arm, a fulcrum bearing having its ends mounted in the ends of said bifurcation, and a hook on the end of the actuating arm, said hook having an open throat to admit said fulcrum bearing and constricted to retain the fulcrum bearing in fixed position therein.

8. In a typewriter, in combination, a ribbon vibrator, an arm for supporting said vibrator, and a pivotally mounted actuating arm having a pivotal connection with said supporting arm, said connection including a bifurcation on the end of the supporting arm, a fulcrum bearing having its ends mounted in the ends of said bifurcation, the intermediate portion of said bearing being larger than said ends and forming spacing stops for the inner edges of said bifurcation, and a hook on the end of the actuating arm, said hook having an open throat to admit said fulcrum bearing and constricted to retain the bearing in fixed position therein.

9. In a typewriter, in combination, a ribbon vibrator, an arm for supporting said vibrator, a pivotally mounted actuating arm pivotally connected with said supporting arm, an actuating pin transversely mounted on an end of said actuating arm, a pivotally mounted arm having a sliding connection with said pin, a toggle having one link pivotally connected with said sliding-connection arm, a pivoted arm having a sliding connection with the other link of said toggle, a plurality of stops for selectively engaging said pivoted arm, to determine the effective throw of the toggle, an adjustable stop for determining the initial position of said sliding-connection arm, a key-actuated universal bar, an arm mounted thereon, and a link connecting said toggle and said universal-bar arm whereby said vibrator may be moved to a plurality of predetermined operative positions from a positively adjustable inoperative position.

10. In a typewriter, in combination, a ribbon vibrator, an arm for supporting said vibrator, a pivotally mounted actuating arm pivotally connected with said supporting arm, an actuating pin transversely mounted on an end of said actuating arm, and a pivotally mounted arm having a sliding connection with said pin, said vibrator and said actuating arm being mounted for case-shifting, said transverse pin being movable along said slide during case-shifting, the effective wall of the slide being inclined to the axis of the sliding-connection arm, whereby the throw of the actuating arm in one position may be adjusted

with relation to the throw of the actuating arm in another position.

11. In a typewriter, in combination, a ribbon vibrator, an arm for supporting said vibrator, a pivotally mounted actuating arm pivotally connected with said supporting arm, an actuating pin transversely mounted on an end of said actuating arm, and a pivotally mounted arm having a slot connection with said pin, said vibrator and said actuating arm being mounted for case-shifting, said transverse pin being movable in said slot during case-shifting, the effective surfaces of the walls of the slot being inclined to the axis of the slotted arm, whereby the throw of the actuating arm in one position may be adjusted with relation to the throw of the actuating arm in another position.

12. In a typewriter, in combination, a ribbon vibrator normally below the printing line, an arm for throwing said vibrator, a toggle for actuating said arm, a link for actuating said toggle, a universal bar actuable by a plurality of key-levers, and a bendable arm connecting the link and the universal bar whereby the amount of actuating motion of said toggle may be varied to vary the throw of the ribbon.

13. In a typewriter, in combination, a ribbon vibrator normally below the printing line, an arm for throwing said vibrator, a toggle for actuating said arm, a link for actuating said toggle, a universal bar actuable by a plurality of key-levers, and a bendable arm substantially horizontally positioned and connecting the link and the universal bar whereby the amount of actuating motion of said toggle may be varied to vary the throw of the ribbon.

14. In a typewriter, in combination, a ribbon vibrator normally below the printing line, an arm for throwing said vibrator, a toggle for actuating said arm, a link for actuating said toggle, a universal bar actuable by a plurality of key-levers, reinforcing means on the universal bar to prevent bending of said bar, and a bendable arm substantially horizontally positioned, connecting the link and the universal bar whereby the amount of actuating motion of said toggle may be varied to vary the throw of the ribbon.

15. In a typewriting machine, in combination, a plurality of key-levers, a universal bar mounted transversely of and beneath said key-levers, a rock-shaft, arms supporting said universal bar on said rock-shaft, means for operating a ribbon-vibrator connected with said universal bar, a transversely mounted spacer-bar rock-shaft, and a stop arm mounted on said first named rock-shaft and engaging said spacer-bar rock-shaft.

16. In a typewriting machine, in combination, a plurality of key-levers, a universal bar mounted transversely of and beneath said key-levers, a rock-shaft, arms supporting said universal bar on said rock-shaft, means for operating a ribbon-vibrator connected with said universal bar, a transversely mounted spacer-bar rock-shaft, and an adjustable stop arm mounted on said first named rock-shaft and engaging said spacer-bar rock-shaft.

17. In a ribbon-vibrating mechanism for typewriters, in combination, a ribbon vibrator, a toggle operatively connected to said vibrator and having articulated links operable from uniformly broken to straight condition, and selectively variable means for varying the effective throw of said toggle to move said vibrator to various predetermined operating positions.

18. In a ribbon-vibrating mechanism for type-

writers having a frame and a platen-carriage case-shiftable thereon, in combination, a ribbon vibrator and an actuating arm for said vibrator, mounted to move with said carriage in case-shifting, a reciprocatory arm operatively mounted on the frame and having a pin and slot connection to said actuating arm to permit movement thereof with the carriage in case-shifting, said slot being disposed to correspond with the case-shift direction, a toggle on the frame flexibly connected to said reciprocatory arm and operatively mounted on the frame, and selective means for varying the effective throw of said toggle to move the vibrator to various operating positions.

19. In a ribbon-vibrating mechanism for typewriters, in combination, a ribbon vibrator, a toggle having one link operatively connected with said vibrator, means operable in uniform strokes for actuating said toggle, a normally fixed pin, the other link of said toggle having a slot slidably engaging said pin and affording a limited ineffective motion of said toggle, and means for selectively setting said pin to vary the limits of ineffective motion and correspondingly vary the extent of movement of said vibrator.

20. In a ribbon-vibrating mechanism for typewriters, in combination, a ribbon vibrator, an actuating train for said vibrator, including an oscillatory arm, a toggle having first and second links, said first link being pivoted to said arm, a selectively settable pin, the other link of said toggle being slidably engaged for limited endwise movement on said pin, and means operable in a uniform stroke for actuating said toggle, the actuation of said toggle initially tending to straighten the toggle with the first said link swinging about the pivot of said arm, the arm being normally stationary while the second said link slides on said pin to take up the limited endwise movement of said second link, and upon further actuation, to move said toggle to substantially straight condition and thereby actuate said arm by cooperation of the toggle with said pin, the selective setting of said pin being effective to vary the predetermined movement of said arm.

21. In a ribbon-vibrating mechanism for typewriters, in combination, a ribbon vibrator, an oscillatory arm operatively connected with said vibrator, a toggle having one link pivotally connected to said arm, a settable pin, the other link of said toggle being slidably engaged for limited endwise movement on said pin, means for selectively setting said pin to vary the throw of said toggle, and a series of stops selectively engageable with said oscillatory arm to prevent overthrow of said vibrator.

22. In a ribbon-vibrating mechanism for typewriters, in combination, a ribbon vibrator, an oscillatory arm operatively connected with said vibrator, a toggle having one link pivoted to said arm, a settable pin, the other link of said toggle being slidably engaged for limited endwise movement on said pin, a series of stops selectively pre-

sentable to said arm to prevent overthrow of said vibrator, and means for selectively setting said pin to vary the effective throw of said toggle and concomitantly set one of said stops.

23. In a ribbon-vibrating mechanism for typewriters, in combination, a ribbon vibrator, an oscillatory arm operatively connected with said vibrator, a toggle having one link pivotally connected to said arm, a settable pin, the other link of said toggle being slidably engaged for limited endwise movement on said pin, an arm carrying said pin, and a movable cam engaging said pin-carrying arm to selectively set said pin and thereby vary the effective throw of said toggle.

24. In a ribbon-vibrating mechanism for typewriters, in combination, a ribbon vibrator, an oscillatory arm operatively connected with said vibrator, a toggle having one link pivotally connected to said arm, a settable pin, the other link of said toggle being slidably engaged for limited endwise movement on said pin, an arm carrying said pin, a movable cam engaging said pin-carrying arm to selectively set said pin and thereby vary the effective throw of said toggle, and a series of stops selectively presentable to said oscillatory arm to prevent overthrow of said vibrator.

25. In a ribbon-vibrating mechanism for typewriters, in combination, a ribbon vibrator, an oscillatory arm operatively connected with said vibrator, a toggle having one link pivotally connected to said arm, a settable pin, the other link of said toggle being slidably engaged for limited endwise movement on said pin, an arm carrying said pin, a series of shoulders selectively presentable to said pin-carrying arm, and a series of stops selectively presentable to said oscillatory arm to prevent overthrow of said vibrator.

26. In a ribbon-vibrating mechanism for typewriters, in combination, a ribbon vibrator, an oscillatory arm operatively connected with said vibrator, a toggle having one link pivotally connected to said arm, a settable pin, the other link of said toggle being slidably engaged for limited endwise movement on said pin, an arm carrying said pin, a series of shoulders selectively presentable to said pin-carrying arm, a series of stops selectively presentable to said oscillatory arm to prevent overthrow of said vibrator, and means for concomitantly setting said shoulders and said stops.

27. In a ribbon-vibrating mechanism for typewriters, in combination, a ribbon vibrator, an oscillatory arm operatively connected with said vibrator, a toggle having one link pivotally connected to said arm, a settable pin, the other link of said toggle being slidably engaged for limited endwise movement on said pin, means for selectively setting said pin to vary the throw of said toggle, and a stop engaging said arm in active position thereof to predetermine the initial position of said vibrator.

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