

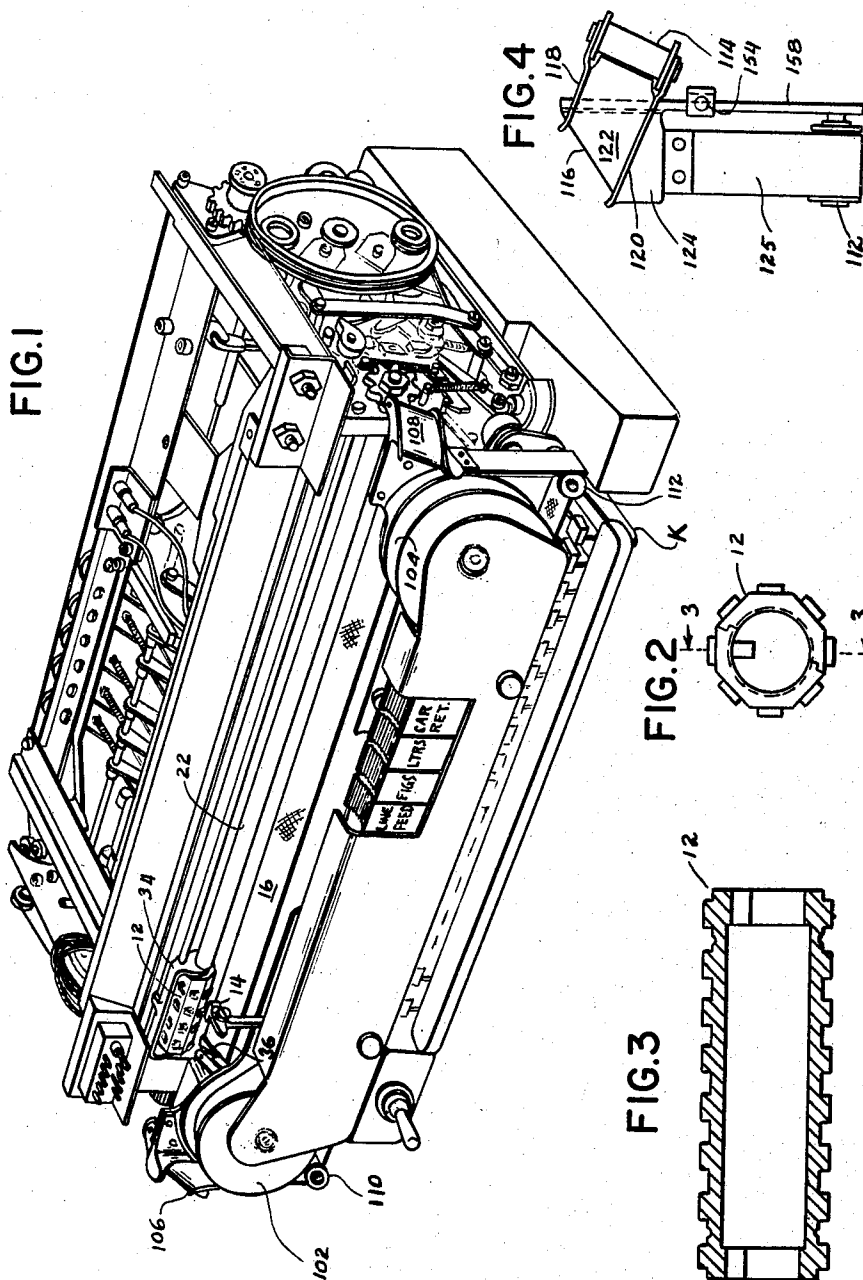
Nov. 17, 1959

B. HOWARD
TYPEWRITING MACHINE

2,913,089

Filed May 29, 1957

4 Sheets-Sheet 1



INVENTOR.
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BY *James and Franklin*
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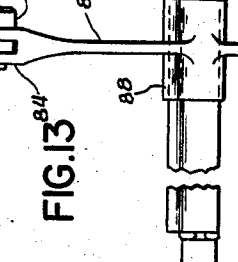
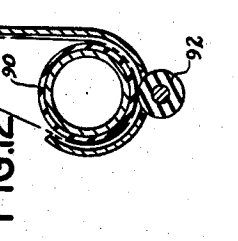
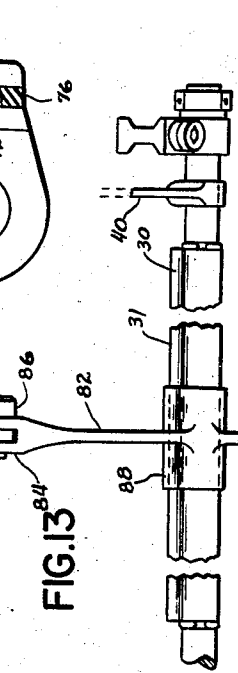
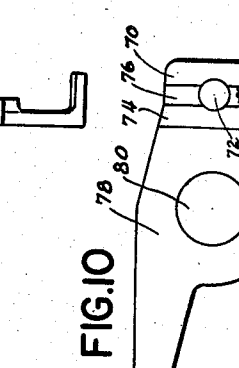
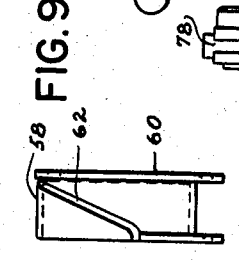
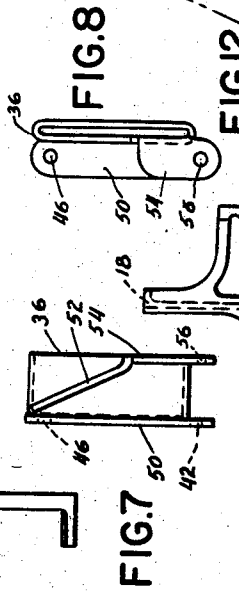
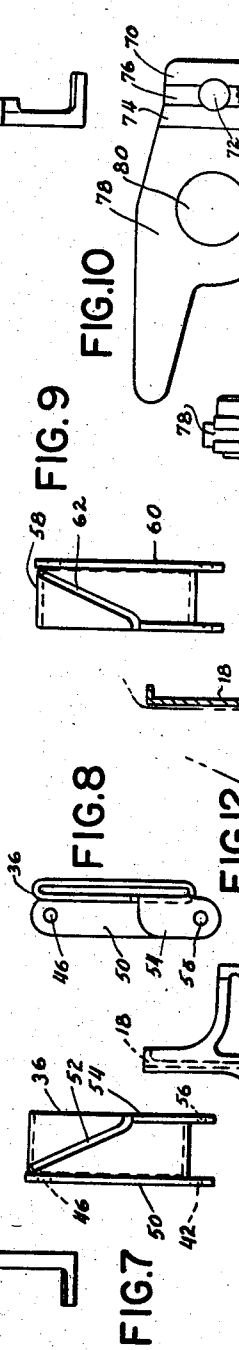
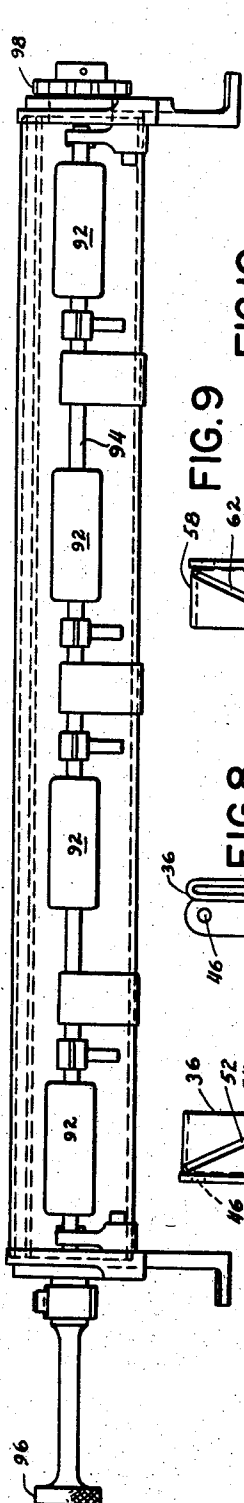
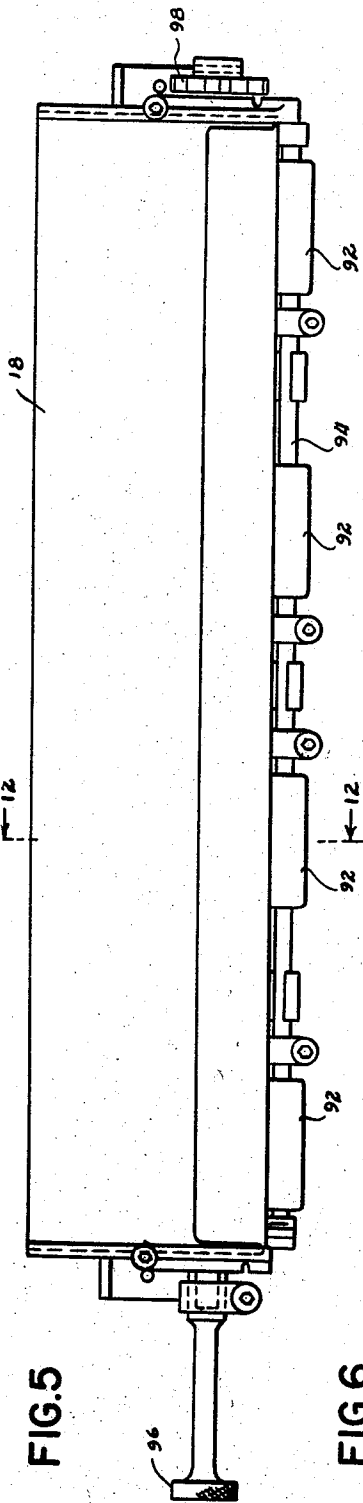
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B. HOWARD
TYPEWRITING MACHINE

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4 Sheets-Sheet 2



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2,913,089

TYPEWRITING MACHINE

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4 Sheets-Sheet 3

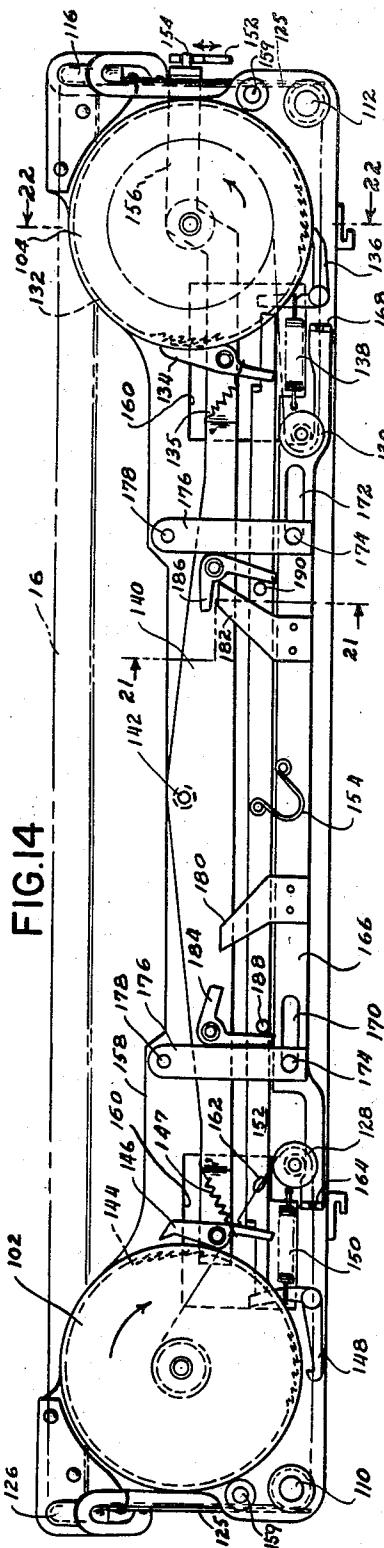


FIG. 14

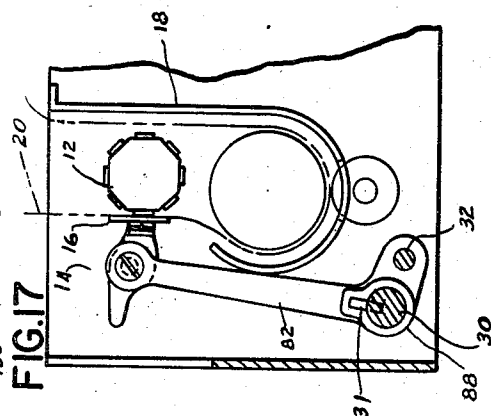


FIG. 17

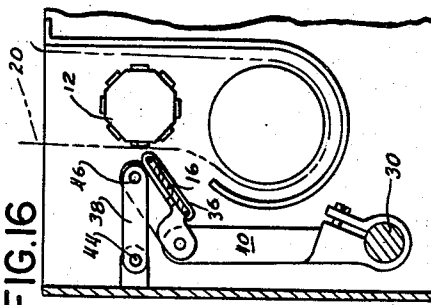


FIG. 16

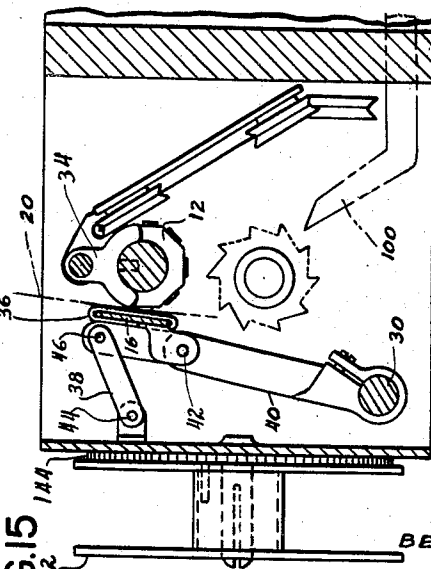
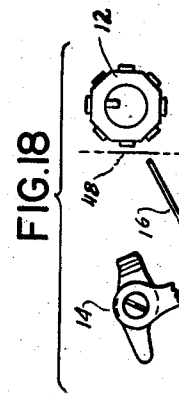


FIG. 15



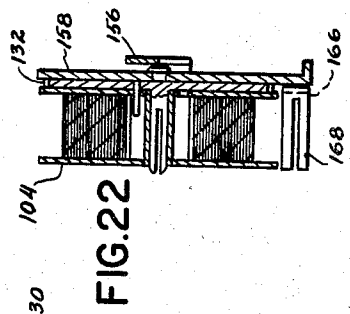
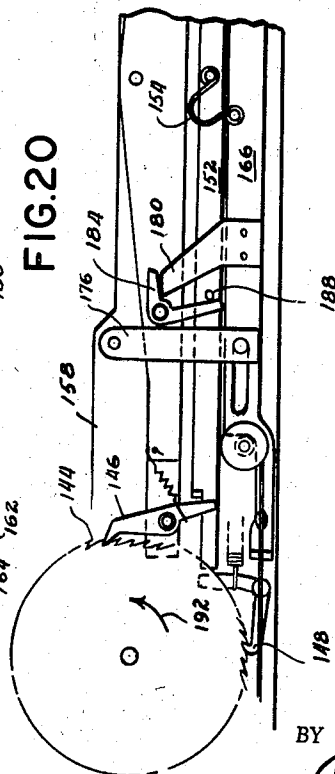
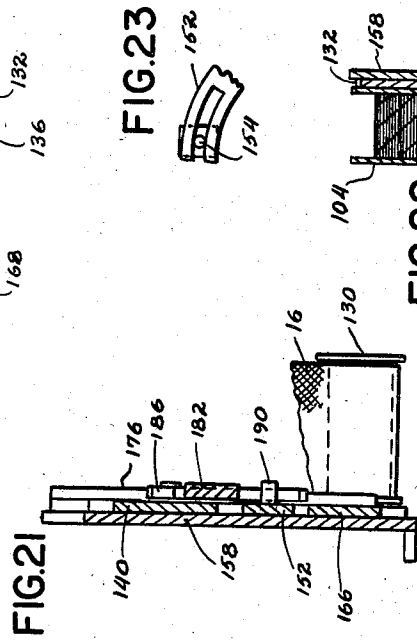
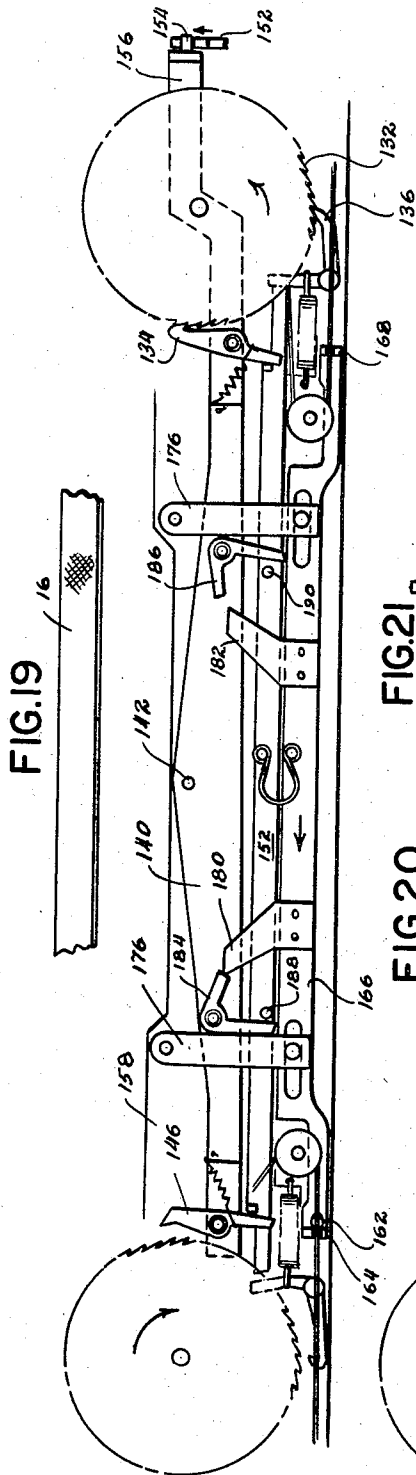
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B. HOWARD
TYPEWRITING MACHINE

2,913,089

Filed May 29, 1957

4 Sheets-Sheet 4



INVENTOR.
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2,913,089

TYPEWRITING MACHINE

Bernard Howard, Ramsey, N.J., assignor to Teleprinter Corporation, Hackensack, N.J., a corporation of New Jersey

Application May 29, 1957, Serial No. 662,371

21 Claims. (Cl. 197—49)

This invention relates to typewriting machines, and more particularly to the printing and ink ribbon mechanism for the same.

The primary object of the present invention is to generally improve typewriting machines.

A more particular object is to provide such a machine in which the line being printed is fully exposed to observation between the printing of successive characters, which requires movement of the printing mechanism and the inked ribbon. A further object is to improve the vibration of the ribbon between working and retracted positions; to make this possible with minimum motion and inertia of moving parts; and to make this possible in a machine in which the paper is stationary while the printing point moves across the paper, thus minimizing the length of idle ribbon available at the ends of the line to accommodate the vibration and all while maintaining the ribbon desirably taut.

Further objects are to improve the compactness of the machine by a novel disposition of the spools for the inked ribbon. Another object is to provide an improved means for drive and reversal of spools in their new position.

The features of the invention are here shown applied to a telegraphic printing machine, and a further and specific object of the invention is to generally improve the telegraphic printing machine disclosed in my Patent 2,769,029, issued October 20, 1956, and in my copending application Serial No. 596,294, filed July 6, 1956 and entitled "Telegraphic Printing Apparatus."

To accomplish the foregoing objects, and such other objects as hereinafter appear, my invention resides in the typewriting machine elements, and their relation one to another, as are hereinafter more particularly described in the following specification. The specification is accompanied by drawings in which:

Fig. 1 is a perspective view showing a telegraphic printing machine embodying features of my invention;

Fig. 2 is an end view of a type cylinder used in the machine shown in Fig. 1;

Fig. 3 is a longitudinal section through the type cylinder taken approximately in the plane of line 3—3 of Fig. 2;

Fig. 4 is an end view of ribbon turning means used at the ends of the machine shown in Fig. 1;

Fig. 5 is a front elevation of the paper feed mechanism;

Fig. 6 is a bottom view of the same;

Fig. 7 is a front elevation of a ribbon guide;

Fig. 8 is a side elevation of the same;

Fig. 9 is a front elevation of a second ribbon guide;

Fig. 10 is a side elevation, drawn to enlarged scale, of the head of the hammer;

Fig. 11 is an end view of the paper feed mechanism;

Fig. 12 is a section taken approximately in the plane of the line 12—12 of Fig. 5;

Fig. 13 is a front elevation of the hammer mechanism;

Fig. 14 is a front elevation of the ribbon spool drive mechanism;

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Fig. 15 is a transverse section showing the ribbon guide in working position;

Fig. 16 shows the ribbon guide in retracted position;

Fig. 17 shows the printing hammer in working position;

Fig. 18 shows the same parts in retracted position;

Fig. 19 is a view similar to Fig. 14 but showing a part of the action when the end of the ribbon is reached;

Fig. 20 is a view similar to the left end of Fig. 19 but showing completion of reversal of ribbon feed;

Fig. 21 is a section drawn to enlarged scale and taken in the plane of the line 21—21 of Fig. 14;

Fig. 22 is a section taken approximately in the plane of the line 22—22 in Fig. 14; and

Fig. 23 is a detail.

Referring to the drawing, and more particularly to Fig. 1, I there show a typewriting machine which is designed for telegraphic printing. The mechanism of the machine is generally like that disclosed in my Patent 2,769,029, mentioned above, but the mechanism is disposed in horizontal rather than vertical position, and a keyboard K is slidably disposed beneath the printer. In Fig. 1, the keyboard is shown in its retracted position, that is, pushed back beneath the printer, but it may be moved out from beneath the printer to its working position. This arrangement of the printer and keyboard are disclosed in my copending application Serial No. 596,294, mentioned above.

Referring to Fig. 1, the type body is shown at 12, and in this case, it is a type cylinder. The cooperating hammer is shown at 14. The inked ribbon is illustrated in its retracted position at 16. The paper has been omitted in order to better expose the parts of the machine.

Referring now to Fig. 17 of the drawing, the machine comprises a paper guide 18 which receives a sheet of paper 20. The type body 12 is disposed behind the paper 20, and the inked ribbon 16 is disposed in front of the paper. The hammer 14 is in front of the linked ribbon 16, and it has a flat face for engaging the ribbon. Thus, the desired character on the type body 12 is printed through the paper from behind, when the ribbon and paper are struck by the hammer.

In the particular machine here shown, the type body is a cylinder, as is best shown in Figs. 2 and 3. It is octagonal in section, and thus may carry eight characters around its periphery, as shown in Fig. 2, and it is eight characters long, as shown in Fig. 3, thus adapting the cylinder to carry as many as 64 characters. The cylinder is splined to a shaft 22 (Fig. 1) which has a keyway for that purpose. The cylinder is movable across the paper, as well as being movable for character selection, and the paper is not moved from side to side, that is, there is no slidable paper carriage as in a conventional typewriter. The hammer 14 is similarly slidably keyed to a hammer shaft, best shown at 30 in Fig. 17. The hammer is slidable for movement across the paper in order to keep it in front of the type cylinder. The operating movement of the hammer is produced by oscillation of the shaft 30. The sliding movement of the hammer is produced by a cable, secured to the hammer at 32 with the aid of suitable adjusting screws. The sliding movement of the type cylinder 12 (Fig. 1) is similarly produced by means of a cable which may be connected to a yoke 34 (Figs. 1 and 15) enclosing the ends of the type cylinder.

With this arrangement, the ribbon 16 extends across the machine from side to side, and is used over almost its entire length. In a conventional typewriter, the ribbon is vibrated vertically over a large stroke. The printing position is at the center of the typewriter, and there is a substantial length of idle ribbon at each side of the central printing position to accommodate the vertical movement. In the present machine, there is only a very

short length of idle ribbon at each end beyond the edges of the paper. Moreover, it is also desirable to minimize the stroke of the vibration, and the inertia of the vibrating parts.

Referring now to Figs. 15 and 16 of the drawing, the ribbon 16 is carried in a ribbon guide 36. This is pivotally connected to linkage 38 and 40 operated by a shaft 30 to vibrate the guide and ribbon between a working position shown in Fig. 15, and a retracted position shown in Fig. 16. It will be seen that the working position brings the ribbon substantially upright in front of the line being printed on the paper 20. The retracted position is lower and more nearly horizontal, and thereby exposes the line being printed. Essentially, the ribbon is twisted, instead of being vibrated merely vertically in its own plane.

In the present case, the operating means 30 is preferably the hammer shaft previously referred to. It carries generally upright arms 40 at each end of the shaft, the lower ends of the arms being secured to the shaft 30, and the upper ends being pivotally secured at 42 to the lower ends of the ribbon guides. The links 38 are generally horizontal and have their outer ends pivoted on the machine at 44, while their inner ends are pivotally connected at 46 to the ribbon guides. Thus, the oscillation of the shaft 30 to operate the hammer also vibrates the ribbon between its working and its retracted positions.

Fig. 18 shows the hammer 14 and the ribbon 16 in their retracted positions, thus exposing the line being printed, which is located at 48 in front of the type cylinder 12. The ribbon vibration may be rapid and relatively inertialess because only the ribbon guides and linkage are moved, and the movement is largely an arcuate twisting movement, rather than a true vibration of considerable stroke.

Reverting to Fig. 1, one of the two ribbon guides is shown at 36 near one end of the machine. It will be understood that there is a similar but "mirror reversed" ribbon guide at the other end of the machine. The detailed construction of these ribbon guides will be clear from examination of Figs. 7, 8 and 9 of the drawing. Figs. 7 and 8 show (in enlarged scale) the ribbon guide 36, which is at the left end of the machine. It is essentially a link 50 with holes 42 and 46 at its ends, the said link being formed integrally with a guide loop 36. To avoid having to pass the ribbon endwise through the guide loop, it is preferably helically slotted, as shown at 52, thus making it possible to thread the ribbon through the slot and into the guide without disconnecting the ends of the ribbon from the spools. At its lower end, the ribbon guide is provided with a bearing at 54 having a hole 56 aligned with the hole 42 previously referred to.

Referring now to Fig. 9, the ribbon guide 58 is used at the right end of the machine. It is identical to that shown in Fig. 7, except that preferably it is a mirror image, with the link 60 on the right hand side, and with the helical slot 62 sloping in opposite direction to slot 52 in Fig. 7.

The head of the hammer is shown drawn to enlarged scale in Fig. 10. This comprises a striking plate 70 which is slightly rockable on a fulcrum pin 72 relative to the main head 74 of the hammer. A compressible material such as rubber, or a plastics material having the characteristics of rubber, is interposed as shown at 76. In effect the striking surface is somewhat self-adjustable. The rearwardly projecting arm 78 of the hammer has a hole 80 for mounting the same on a hammer arm 82, best shown in Figs. 13 and 17. In Fig. 13 it will be seen that the upper end of the hammer arm is bifurcated at 84 to receive the part 78 of the hammer head, these being locked together, as by a screw 86. The lower end of arm 82 is secured to or formed integrally with a hub 88, which is slidably splined or keyed to the hammer

shaft 30 previously referred to, as by means of a long key 31.

The paper feed arrangement is best shown in Figs. 5, 6, 11 and 12. This comprises a paper guide 18 having a cross section somewhat like the letter J. A paper feed roll 90 is rotatable in the paper guide. It cooperates with a series of four pressure rollers 92 which pass through windows or slots in the bottom of the paper guide 18, so that they can bear against the feed roll 90. The pressure rollers 92 are carried on a shaft 94, and are resiliently urged upward.

The paper feed roll 90 may be turned manually by means of a knob 96 (Figs. 5 and 6). It will be understood that a sheet of paper (or the starting end of a roll of paper) is readily threaded downward and then upward by rotating the feed roll, the paper being guided into the bite or nip of the rolls by the paper guide 18. The upward pass of the paper comes in front of the type cylinder and receives the printing.

The intermittent feed or stepping of the paper from line to line is accomplished by a ratchet wheel 98 (Figs. 5, 6 and 11) at one end of the feed roll. This is operated on by a suitable pawl shown at 100 in Fig. 15 of the drawing.

Reverting now to Fig. 1 of the drawing, the ends of the inked ribbon 16 are wound on spaced ribbon spools 102 and 104. It will be noted that these spools are disposed in an upright plane in front of the machine, and within the ends of the machine, for compactness. Indeed, when the machine is but little wider than the paper, as here shown, a part of each spool is in front of the paper. For this purpose, the machine is preferably provided with ribbon turning means at the ends of the machine for turning the ribbon forwardly and then downwardly, following which the ribbon is led to the spools. The angular ribbon turning means are generally indicated in Fig. 1 at 106 and 108, while additional guide means in the form of rollers are indicated at 110 and 112.

The angularly disposed or sloping turning means for the right end of the machine are better shown in Fig. 4 of the drawing, there being a first angularly disposed turning means 114 which turns the ribbon forwardly, and a second angularly disposed turning means 116 which turns the ribbon downwardly. In the particular case here shown, the turning means 114 is a roller, while the turning means 116 is smoothly finished sheet metal. The structure shown consists of a single piece of metal having edge flanges 118 and 120 between which the ribbon is guided. The resulting track is smoothly bent or rounded at 116 to provide a forwardly extending portion 122, and a downwardly extending portion 124. This is extended by a thin flat resilient strip 125. The roller 114 is carried in bearings formed by extending the flanges 118, 120. It will be understood that the second turning means 116 may be a roller, or a polished round bar, instead of bent metal as shown, and conversely, the turning means 114 may be a polished round bar, or bent sheet metal, instead of a roller as shown.

The angle of roller 114 is a compromise. One purpose is to turn the ribbon forward. However, it is also desired to support the ribbon at an angle which is about half way between its working position and its retracted position, so that the vibration or twist of the ribbon will be to either side of a mid position set by the roller 114. In such case, the ribbon may be quite taut, without interfering with vibration of the same, despite the relatively short length of the end portions beyond or outside the two vibrating ribbon guides.

Referring now to Fig. 14 of the drawing, the turning means 116 is shown at the right end. A similar but "mirror image" turning means is employed at 126 at the left end. From the latter, the ribbon runs downward to a roller 110, and then to another roller 128, and thence upward to spool 102. The leaf spring 125 holds

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the ribbon against roller 110 and acts as a light brake during reversal.

At the other end of the machine, the ribbon runs downward inside leaf spring 125 and around a roller 112, and thence inward to a roller 130, and thence to spool 104.

The spools may be operated and may be reversed at intervals by appropriate mechanism. In the present case, spool 104 is secured to a ratchet wheel 132 operated by a pawl 134. The spool is held against return movement by a check dog 136 urged inward by a pull spring 138. The pawl is carried at one end of a lever or rocker 140 which rocks about a pivot 142 with a see-saw action. The pawl has a spring 135.

At the other end of the machine, spool 102 is similarly secured to a ratchet wheel 144. This also has a pawl 146 and a check dog 148 with pull springs 147 and 150, but the pawl and dog are held outward in inoperative position by means of a pawl shift bar 152, here shown in its left position. The shift bar remains in either a left or right position, because of an over-the-center spring 154. When the shift bar is in its right position, the pawl 146 becomes operative, and pawl 134 is made inoperative, along with their respective check dogs. Thus, the direction of feed of the ribbon is reversed.

Main operating lever or rocker 140 (Fig. 14) is given its rocking or "see-saw" action by means of a finger 152, the bifurcated end of which straddles a pin 154 at the free end of an extension 156 of lever 140. Fig. 23 shows the bifurcated end of finger 152 straddling pin 154. Finger 152 is oscillated by linkage in the telegraphic printing machine associated with the operation of the hammer, so that there is one vibration for each vibration of the hammer, the motion of the ribbon preferably taking place during the return motion of the hammer. Thus, a new area of ribbon is moved in front of the hammer before each stroke.

In Fig. 22, it will be seen that the extension 156 is located in back of the main stationary plate 158 on which all parts of the ribbon feed mechanism are mounted. Reverting to Fig. 14, the rocker 140 itself is disposed in front of the stationary plate 158, but the latter is cut away at 160, and rocker 140 is offset or stepped rearwardly through the window 160, thus bringing the extension 156 behind the plate 158. The left end of plate 158 is provided with a similar window 160, and the left end of rocker 140 is similarly stepped rearward, but this is merely to permit pawl 146 to operate in the same plane as the ratchet wheel 144.

The ribbon reversal is initiated by a small eyelet or rivet secured to the ribbon near each end. Ribbons are already made and sold with such eyelets for use on typewriters. In Fig. 14, the ribbon is being wound on spool 104, and has been nearly completely unwound from spool 102, thus exposing an eyelet 162 which is shown approaching roller 128. After roller 128, the ribbon passes through an open ended slit 164 in the forwardly turned end of a slide bar 166. The latter has a similar forwardly turned slit part 168 at its right end, through which the ribbon passes near roller 130. The slide bar 166 is slotted at 170 and 172 to receive stationary pins 174 which help mount upright bearing strips 176 on stationary plate 158. The strips 176 are further held by upper pins 178, and the spacing between bearing strips 176 and back plate 158 is such as to afford free movement of pawl shift bar 152, rocker lever 140, and slide bar 166, all of which are guided by the upright bearing strips 176, and held against movement away from back plate 158.

The configuration of the forwardly turned end 168 of slide bar 166 will be seen from inspection of Fig. 22. The slot is ample for free passage of the inked ribbon, but not for the eyelet, and reverting to Fig. 14, it will be seen that when eyelet 162 reaches the slit at 164, the slide bar 166 will be moved to the left by the continued motion of the ribbon.

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Referring now to Fig. 19, the eyelet 162 has moved slide bar 166 part way to the left. The pawl shift bar 162 has not yet moved, and the pawls continue to operate as before. The slide bar 166 carries two stops or abutments 180 and 182. The rocker 140 carries two small angle levers 184 and 186. These have depending arms which cooperate with projections or pins 188 and 190 on pawl shift bar 152. In Fig. 19, the stop 182 has been moved away from angle lever 186, and the stop 180 has been moved toward angle lever 184.

If the latter is down, as shown, the stop 180 momentarily abuts the end of lever 184. However, as the left end of rocker 140 rises with lever 184, the stop 180 slides beneath lever 184, and then when the left end of rocker 140 again descends, the lever 184 bears against stop 180. This causes the lever to turn from the position shown in Fig. 19 to that shown in Fig. 20, thus causing the depending arm of the lever to move the pin 188 and the pawl shift bar 152 to the right, as shown in Fig. 20.

It will be noted that at this time, the over-the-center spring 154 has moved to a position opposite that shown in Fig. 14, thus tending to hold the slide bar 166 to the left, and the pawl shift bar 152 to the right. In any case, the latter movement frees the tail ends of the operating pawl 146 and the check dog 148, which thereupon engage the ratchet wheel 144 and thereupon become operative to turn the ratchet wheel. It then turns in opposite direction, as indicated by arrow 192, and rewinds the ribbon on the left spool, while unwinding it from the right spool. Although the right end is not shown in Fig. 20, it will be understood by reference to Fig. 19 that the motion of pawl shift bar 152 to the right disengages pawl 134 and check dog 136 from the ratchet wheel 132, thus freeing the right spool for unwinding of the ribbon at the same instant that the left spool begins to wind the ribbon. It will also be understood that an eyelet like the eyelet 162 is provided near the other end of the ribbon for cooperation with the slit end 168 of slide bar 166, so that the ribbon may be fed back and forth repeatedly.

The motion of the ribbon and its eyelet does not have to perform the work of shifting the pawls. The ribbon merely slides the slide bar 166, which sets up suitable conditions for shifting the pawls, but the actual work of doing so is performed by a force obtained directly from the rocker 140. It will also be understood that when the other end of the ribbon is reached, it is the reaction of stop 182 on angle lever 186 which causes the latter to bear against pin 190, and so to shift the pawl shift bar 152 from its right hand position, shown in Fig. 20 of the drawing, to its left hand position, shown in Figs. 14 and 19 of the drawing, thus disengaging pawl 146 and engaging pawl 134. Thus, the slide bar 166 moves the stop means. The drive means (rocker 140) moves the shift means (184, 186), to move the pawl shift bar 152, but the shift means 184, 186 is normally inoperative, and is made momentarily operative by the slide bar.

It should be understood that in some cases, the printer may be disposed generally vertical, instead of horizontal as shown in Fig. 1, and in such case the ribbon spools would lie in a horizontal plane instead of a vertical plane, and the printing would be read by looking downward from above. It will therefore be understood that the reference in the claims to the spools being upright is intended to be understood in a relative sense, relative to the paper being printed, which here is also generally upright.

It is believed that the construction and operation, as well as the advantages of my improved typewriting machine, will be apparent from the foregoing detailed description.

The hammer head is self-adjustable. The ribbon twist vibration minimizes motion, and is possible with a reasonably taut ribbon despite the short length of idle ribbon at each end of the machine available to accommodate the vibration. The moving metal parts which vibrate the ribbon are small, simple, and may be made very light in

weight, thus minimizing inertia. Despite the small twist motion of the ribbon, it is moved fully out of the way of the line being printed, thus exposing the line for easy reading. The ribbon spools may be quite large in diameter relative to the small size of the machine, and may be disposed in front of the machine within the ends of the machine, and indeed, even partially in front of the paper, so that there is no appreciable loss of compactness, while using large standard typewriter spools. The direction of feed of the ribbon is reversed without putting any appreciable load on the ribbon itself to cause the reversal of direction. Any slack which may tend to form in the ribbon during ribbon reversal is prevented from reaching the active or working length of ribbon in front of the paper, by the smooth spring brakes 125. The entire ribbon mechanism except for the loops 36, 52 is mounted on a single plate 158, attached by only two screws 159, and thus is readily removable for servicing, or for a machine which is to be used with a special paper having a coating of pressure sensitive ink. This lessens the mechanical load, and lessens the weight, as when the unit is to be airborne.

It will be apparent that while I have shown and described my invention in a preferred form, changes may be made in the structure shown, without departing from the scope of the invention as sought to be defined in the following claims.

I claim:

1. In a typewriting machine utilizing an inked ribbon, and in which the printing point moves step by step across the paper while the paper remains stationary, ribbon vibrating mechanism comprising two spaced ribbon guides outside the side edges of the paper, said guides being pivotally connected to linkage supporting the same at each end of the machine, and means so operating the linkages in unison as to vibrate the guides and ribbon between a working position and a retracted position, said working position bringing the entire length of the ribbon which is in front of the paper substantially upright in front of the line being printed, and said retracted position being more nearly horizontal and thereby exposing the entire line being printed.

2. In a typewriting machine utilizing an inked ribbon, ribbon vibrating mechanism comprising two spaced ribbon guides, an oscillatable horizontal shaft below said guides, generally upright arms having their lower ends secured to said shaft, and having their upper ends pivotally secured to the lower ends of the ribbon guides, and generally horizontal links having their forward ends pivoted on the machine, and having their rear ends pivotally connected to the upper ends of the ribbon guides, the oscillation of said shaft causing vibration of the guides and ribbon between working and retracted positions, said working position bringing the ribbon substantially upright in front of the line being printed, and said retracted position being more nearly horizontal and thereby exposing the line being printed.

3. In a typewriting machine utilizing an inked ribbon, and in which the printing point moves step by step across the paper while the paper remains stationary, ribbon vibrating mechanism comprising a ribbon guide near one side edge of the paper, a ribbon guide near the other side edge of the paper, an oscillatable horizontal shaft below said guides, generally upright arms having their lower ends secured to said shaft, and having their upper ends pivotally secured to the lower ends of the ribbon guides, and links having their forward ends pivoted on the machine, and having their rear ends pivotally connected to the upper ends of the ribbon guides, the oscillation of said shaft causing vibration of the guides and ribbon between working and retracted positions, said working position bringing the ribbon substantially upright in front of the line being printed, and said retracted position being more nearly horizontal and thereby exposing the line being printed.

4. In a typewriting machine utilizing an inked ribbon, and in which the printing point moves step by step across the paper while the paper remains stationary, ribbon vibrating mechanism comprising a helically slotted ribbon guide beyond one side edge of the paper, a helically slotted ribbon guide beyond the other side edge of the paper, an oscillatable horizontal shaft below said guides, generally upright arms having their lower ends secured to said shaft, and having their upper ends pivotally secured to the lower ends of the ribbon guides, and generally horizontal links having their forward ends pivoted on the machine, and having their rear ends pivotally connected to the upper ends of the ribbon guides, the oscillation of said shaft causing vibration of the guides and ribbon between working and retracted positions, said working position bringing the ribbon substantially upright in front of the line being printed, and said retracted position being lower and more nearly horizontal and thereby exposing the line being printed.

5. A typewriting machine comprising means to guide a sheet of paper, a shaft behind said paper, a type body slidably splined to said shaft for movement across the paper, an inked ribbon in front of the paper, a hammer in front of the ribbon, said hammer being slidable for movement across the paper to keep it in front of the type body, the desired character on the type body being printed through the paper from behind when the ribbon is struck by the hammer, a ribbon guide near one side edge of the paper, a ribbon guide near the other side edge of the paper, linkage pivotally secured to the ribbon guides, and means actuating the linkage in timed relation to the hammer in order to vibrate the guides and ribbon between working and retracted positions, said working position bringing the ribbon substantially upright in front of the line being printed and in the path of the hammer, and said retracted position being more nearly horizontal and thereby exposing the line being printed.

6. A typewriting machine comprising means to guide a sheet of paper, a shaft behind said paper, a type body slidably splined to said shaft for movement across the paper, an inked ribbon in front of the paper, a hammer shaft, a hammer in front of the ribbon, said hammer being slidably splined to said shaft for movement across the paper to keep it in front of the type body, the desired character on the type body being printed through the paper from behind when the ribbon is struck by the hammer, a ribbon guide near one side edge of the paper, a ribbon guide near the other side edge of the paper, generally upright arms having their lower ends secured to said hammer shaft, and having their upper ends pivotally secured to the lower ends of the ribbon guides, and generally horizontal links having their forward ends pivoted on the machine, and having their rear ends pivotally connected to the upper ends of the ribbon guides, the oscillation of said hammer shaft causing vibration of the guides and ribbon between working and retracted positions, said working position bringing the ribbon substantially upright in front of the line being printed and in the path of the hammer, and said retracted position being more nearly horizontal and thereby exposing the line being printed.

7. A typewriting machine comprising means to guide a sheet of paper, a shaft behind said paper, a type cylinder slidably splined to said shaft for movement across the paper and also for character selection, an inked ribbon in front of the paper, a hammer shaft, a hammer in front of the ribbon, said hammer being slidably splined to said shaft for movement across the paper to keep it in front of the type cylinder, the desired character on the type cylinder being printed through the paper from behind when the ribbon is struck by the hammer, a helically slotted ribbon guide beyond one side edge of the paper, a helically slotted ribbon guide beyond the other side edge of the paper, generally upright arms having their lower ends secured to said hammer shaft,

and having their upper ends pivotally secured to the lower ends of the ribbon guides, and generally horizontal links having their forward ends pivoted on the machine, and having their rear ends pivotally connected to the upper ends of the ribbon guides, the oscillation of said hammer shaft causing vibration of the guides and ribbon between working and retracted positions, said working position bringing the ribbon substantially upright in front of the line being printed and in the path of the hammer, and said retracted position being lower and more nearly horizontal and thereby bringing the ribbon below the line being printed in order to expose the same.

8. In a typewriting machine utilizing an inked ribbon mechanism for carrying two ribbon spools, said mechanism having means mounting said spools in an upright plane in front of said machine and within the ends of said machine for compactness, sloping ribbon turning means at each end of the machine for turning the ribbon forwardly, another sloping ribbon turning means at each end of the machine for turning the ribbon downwardly to said spools, said ribbon being very short and generally upright in the forwardly extending portion between the two sloping ribbon turning means at each end, said sloping means being close to one another.

9. In a typewriting machine utilizing an inked ribbon, mechanism for carrying and rotating two ribbon spools, said mechanism having means mounting said spools in an upright plane in front of said machine and within the ends of said machine for compactness, a sloping ribbon turning means at each end of the machine for turning the ribbon forwardly, another sloping ribbon turning means at each end of the machine for turning the ribbon downwardly, a horizontal roller at each end of the machine for turning the ribbon inwardly to said spools, said ribbon being very short and generally upright in the forwardly extending portion between the two sloping ribbon turning means at each end, said sloping means being close to one another, a ratchet wheel for each spool, a pawl for each ratchet wheel, and means to make one pawl or the other operative.

10. In a typewriting machine utilizing an inked ribbon, mechanism for carrying and rotating two ribbon spools, said mechanism having means mounting said spools in an upright plane in front of said machine and within the ends of said machine for compactness, a sloping ribbon turning means at each end of the machine for turning the ribbon forwardly, another sloping ribbon turning means at each end of the machine for turning the ribbon downwardly, means leading the ribbon to said spools, said ribbon being very short and generally upright in the forwardly extending portion between the two sloping ribbon turning means at each end, said sloping means being close to one another, a ratchet wheel for each spool, a pawl for each ratchet wheel, means for operating said pawls, and a pawl shift bar for making one of said pawls operative and the other inoperative for feeding the ribbon in one direction, and vice versa for feeding the ribbon in opposite direction.

11. A typewriting machine comprising means to guide a sheet of paper, a shaft behind said paper, a type body slidably splined to said shaft for movement across the paper, an inked ribbon in front of the paper, a hammer in front of the ribbon, said hammer being slidable for movement across the paper to keep it in front of the type body, the desired character on the type body being printed through the paper from behind when the ribbon is struck by the hammer, two ribbon spools, means mounting said spools in an upright plane in front of said machine and within the ends of said machine for compactness, and two angularly disposed ribbon turning means at each end of the machine for turning the ribbon forwardly and then downwardly to said spools.

12. A typewriting machine comprising means to guide a sheet of paper, an inked ribbon, ribbon vibrating mecha-

nism comprising two spaced ribbon guides near the side edges of the paper, each guide being pivotally connected to linkage supporting the same, means so operating the linkage as to vibrate the guides and ribbon between a working position and a retracted position, said working position bringing the ribbon substantially upright in front of the line being printed, and said retracted position being lower and more nearly horizontal and thereby bringing the ribbon below the line being printed in order to expose the same, two ribbon spools, means mounting said spools in an upright plane in front of said machine and within the ends of said machine for compactness, and two angularly disposed ribbon turning means at each end of the machine outside the ribbon guides for turning the ribbon forwardly and then downwardly to said spools.

13. A typewriting machine comprising means to guide a sheet of paper, a shaft behind said paper, a type body slidably splined to said shaft for movement across the paper, an inked ribbon in front of the paper, a hammer shaft, a hammer in front of the ribbon, said hammer being slidably splined to said shaft for movement across the paper to keep it in front of the type body, the desired character on the type body being printed through the paper from behind when the ribbon is struck by the hammer, a ribbon guide near one side edge of the paper, a ribbon guide near the other side edge of the paper, generally upright arms having their lower ends secured to said hammer shaft, and having their upper ends pivotally secured to the lower ends of the ribbon guides, links having their forward ends pivoted on the machine, and having their rear ends pivotally connected to the upper ends of the ribbon guides, the oscillation of said hammer shaft causing vibration of the guides and ribbon between working and retracted positions, said working position bringing the ribbon substantially upright in front of the line being printed and in the path of the hammer, and said retracted position being more nearly horizontal and thereby exposing the line being printed, two ribbon spools, means mounting said spools in an upright plane in front of said machine for compactness, and two angularly disposed ribbon turning means at each end of the machine outside the ribbon guides for turning the ribbon forwardly and then downwardly to said spools.

14. In a typewriting machine, an inked ribbon mechanism for carrying and rotating two ribbon spools, a ratchet wheel for each spool, a pawl for each ratchet wheel, drive means carrying said pawls for operating the same, a pawl shift bar for making one of said pawls operative and the other inoperative in order to feed the ribbon in one direction or the other, a slide bar extending generally parallel to said shift bar and having a slit at each end through which the ribbon passes, but against which an eyelet near the end of the ribbon bears and causes movement of said slide bar, stop means carried by said slide bar, normally inoperative shift means actuatable by said drive means to shift the pawl shift bar, and means whereby shifting of the stop means makes the shift means momentarily operative to shift the pawl shift bar.

15. In a typewriting machine, an inked ribbon mechanism for carrying and rotating two ribbon spools, a ratchet wheel for each spool, a pawl for each ratchet wheel, a rocker carrying one of said pawls at each end for operating the same, a pawl shift bar for making one of said pawls operative and the other inoperative for feeding the ribbon in one direction or the other, a slide bar extending generally parallel to said shift bar and having a slit at each end through which the ribbon passes, but against which an eyelet near the end of the ribbon bears and causes movement of said slide bar, stops carried by said slide bar, and angle levers carried by said rocker at a spacing such that one stop intercepts one angle lever or vice versa, and the resulting movement of the angle lever against the stop by the rocker causes the angle lever to shift the pawl shift bar.

16. In a typewriting machine, an inked ribbon mecha-

nism for carrying and rotating two ribbon spools, said mechanism having means mounting said spools in an upright plane in front of the said machine and within the ends of said machine for compactness, two angularly disposed ribbon turning means at each end of the machine for turning the ribbon forwardly and then downwardly to said spools, a ratchet wheel for each spool, a pawl for each ratchet wheel, a rocker carrying said pawls for operating the same, a pawl shift bar for making one of said pawls operative and the other inoperative for feeding the ribbon in one direction or the other, a slide bar extending generally parallel to said shift bar and having a slit at each end through which the ribbon passes, but against which an eyelet near the end of the ribbon bears and causes movement of said slide bar, stops carried by said slide bar, and angle levers carried by said rocker at a spacing such that one stop intercepts one angle lever, and the resulting movement of the angle lever against the stop by the rocker causes the angle lever to shift the pawl shift bar.

17. A typewriting machine comprising means to guide a sheet of paper, a type body on one side of the paper, a relatively long hammer arm on the other side of the paper, means to oscillate the hammer arm, the free end of said hammer arm having a head comprising an inner rigid surface, a plate having a hammer face disposed in front of said surface, and a fulcrum therebetween affording limited self-adjustable movement of the face relative to the surface.

18. A typewriting machine comprising means to guide a sheet of paper, a type body on one side of the paper, a relatively long hammer arm on the other side of the paper, means to oscillate the hammer arm, the free end of said hammer arm having a head comprising an inner rigid surface, a plate having a hammer face disposed in front of said surface, a fulcrum therebetween affording limited self-adjustable movement of the face relative to the surface, and cushioning material therebetween around said fulcrum to permit yet slightly inhibit self-adjustable movement of the face relative to the surface.

19. In a typewriting machine utilizing an inked ribbon, mechanism for carrying and rotating two ribbon spools, said mechanism having means mounting said spools in an upright plane in front of said machine and within the ends of said machine for compactness, sloping ribbon turning means at each end of the machine for turning the ribbon forwardly, another sloping ribbon turning means at each end of the machine for turning the ribbon downwardly to said spools, said ribbon being very short and generally upright in the forwardly extending portion between the two sloping ribbon turning means at each end, said sloping means being close to one another, a ratchet wheel for each spool, a pawl for each ratchet wheel, means for operating said pawls, a pawl shift means for making one of said pawls operative and the other inoperative for feeding the ribbon in one direction and vice versa for feeding the ribbon in opposite direction, and an upright back plate on which all of said

mechanism is mounted, said back plate being secured to said machine by means of a few readily releasable screws, for ready removal of said spool carrying and actuating mechanism.

20. A typewriting machine comprising means to guide a sheet of paper, an inked ribbon having a working portion disposed in front of said paper, two ribbon spools, pawl and ratchet mechanism for driving one spool or the other in order to feed the ribbon in one direction or the other, reverse means actuated by eyelets on said ribbon near the ends of said ribbon to make one pawl mechanism operative and the other inoperative in order to reverse the direction of feed of the ribbon, a resilient strip bearing against said ribbon between said reverse means at one end and the working portion, and a resilient strip bearing against said ribbon between said reverse means at the other end and said working portion, said strips exerting a slight braking pressure on said ribbon to keep the same taut at said working portion even during reversing of said ribbon feed.

21. A typewriting machine comprising means to guide a sheet of paper, an inked ribbon, ribbon vibrating mechanism comprising two spaced ribbon guides near the side edges of the paper, each guide being pivotally connected to linkage supporting the same, means so operating the linkage as to vibrate the guides and ribbon between a working position and a retracted position, said working position bringing the ribbon substantially upright in front of the line being printed, and said retracted position being lower and more nearly horizontal and thereby bringing the ribbon below the line being printed in order to expose the same, two ribbon spools, pawl and ratchet mechanism for driving one spool or the other in order to feed the ribbon in one direction or the other, reverse means actuated by eyelets on said ribbon near the ends of said ribbon to make one pawl mechanism operative and the other inoperative in order to appropriately reverse the direction of feed of the ribbon, a resilient strip bearing against said ribbon outside one of said ribbon guides, and a resilient strip bearing against the said ribbon outside the other of said ribbon guides, said strips exerting a slight braking pressure on said ribbon to keep the same taut between said ribbon guides even during reversing of said ribbon feed.

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