Sept. 2, 1952 C. SCHRODER 2,609,077

RIBBON FEED FOR TYPEWRITING MACHINES

Filed Oct. 22, 1949 6 Sheets-Sheet 1

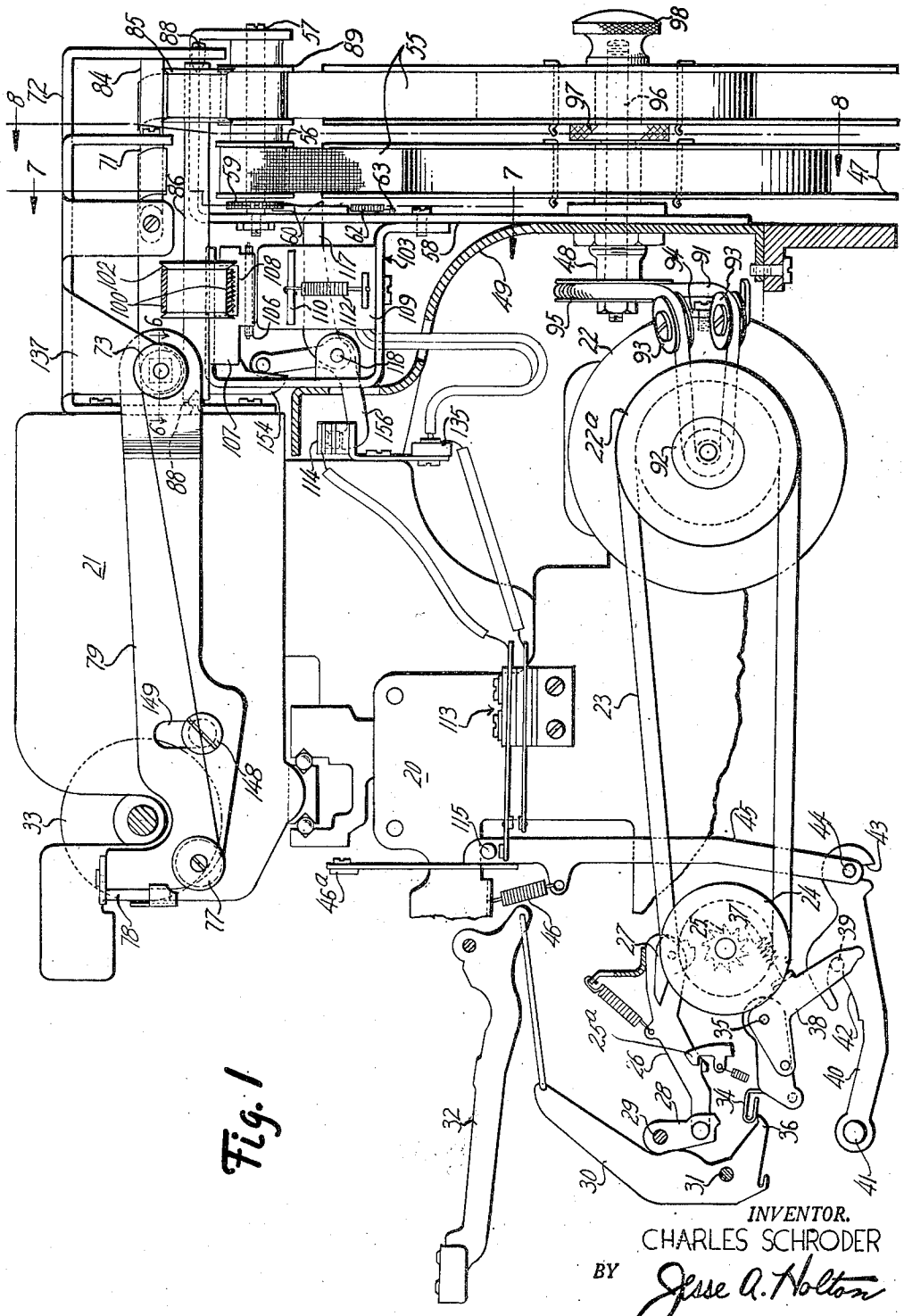


Fig. 1

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RIBBON FEED FOR TYPEWRITING MACHINES

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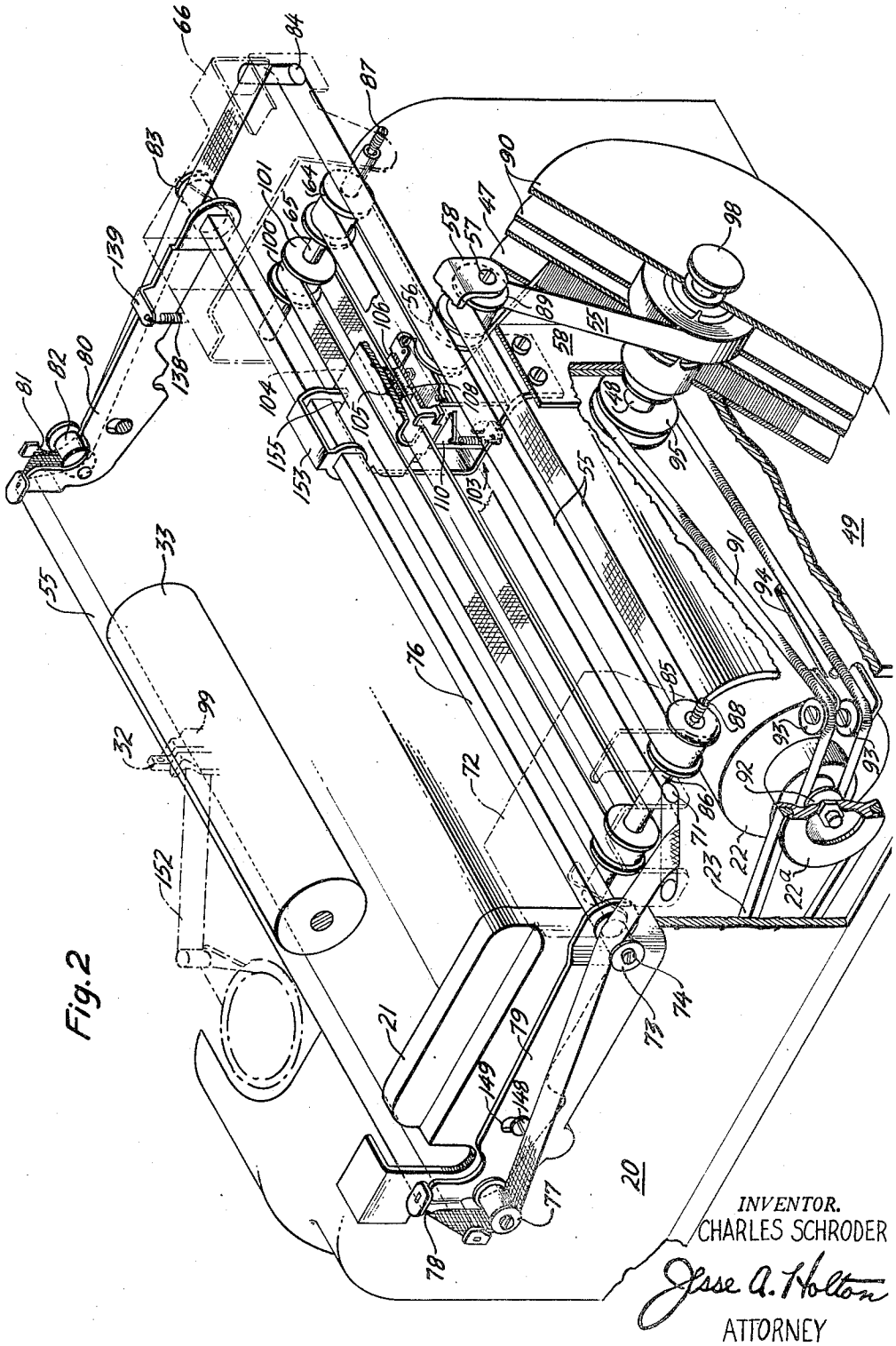


Fig. 2

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RIBBON FEED FOR TYPEWRITING MACHINES

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Fig. 3

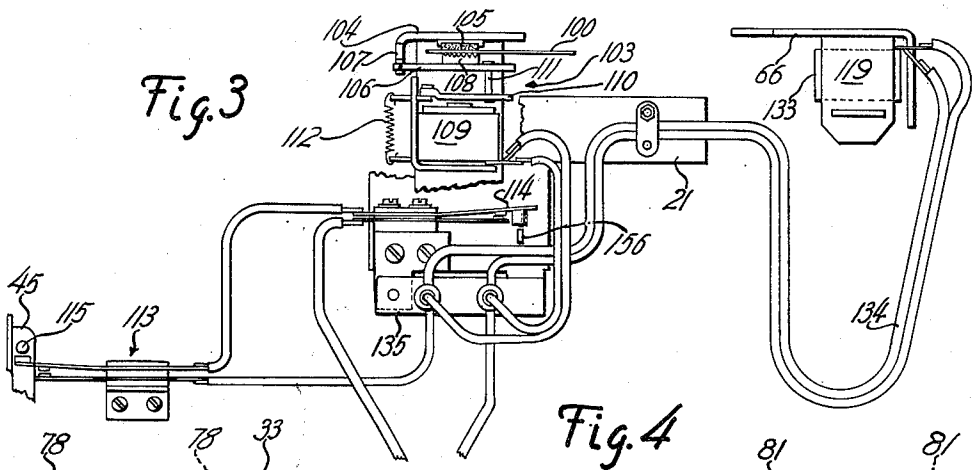


Fig. 4

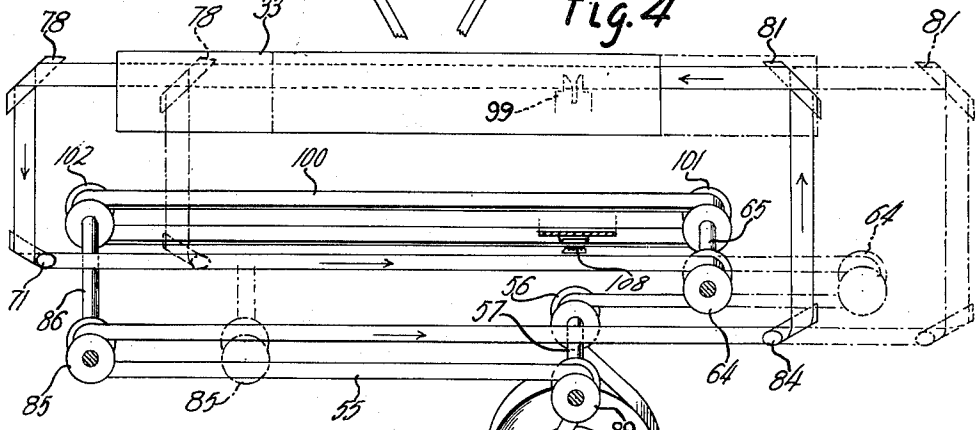


Fig. 5

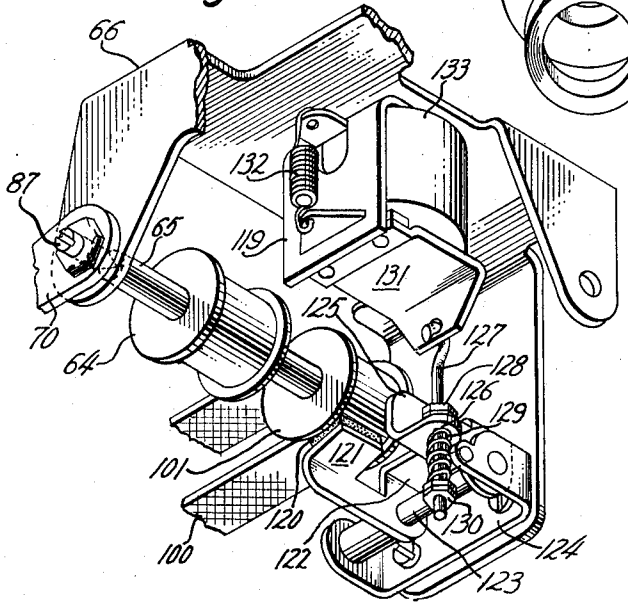
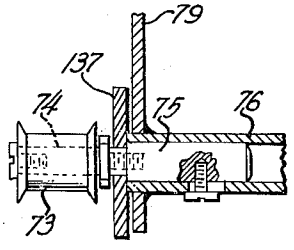


Fig. 6



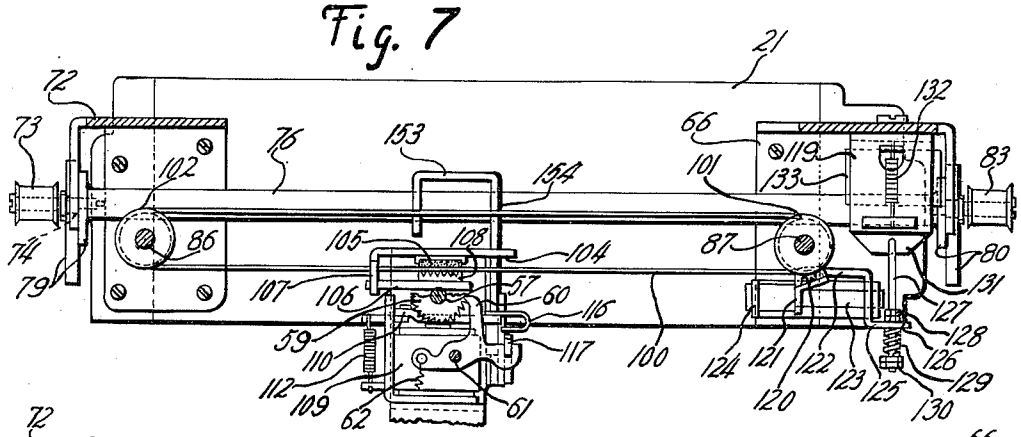
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Sept. 2, 1952 C. SCHRODER 2,609,077

RIBBON FEED FOR TYPEWRITING MACHINES

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Fig. 7



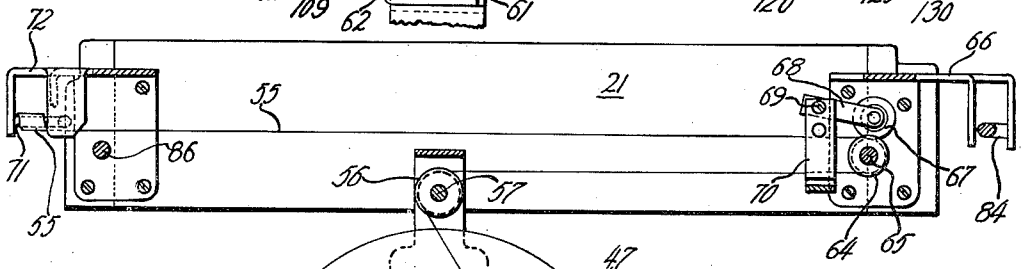
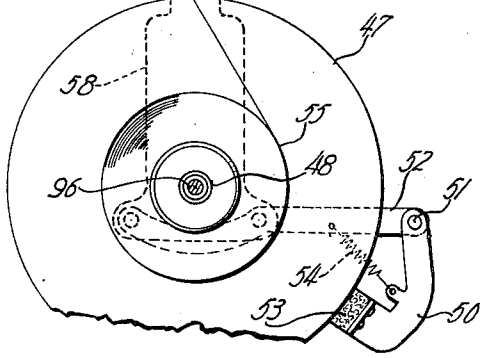


Fig. 8



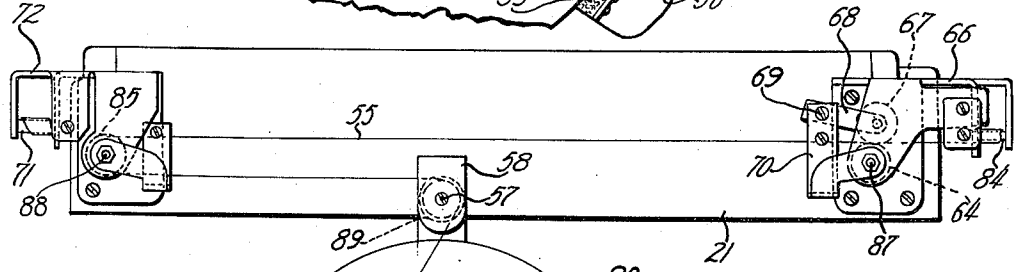
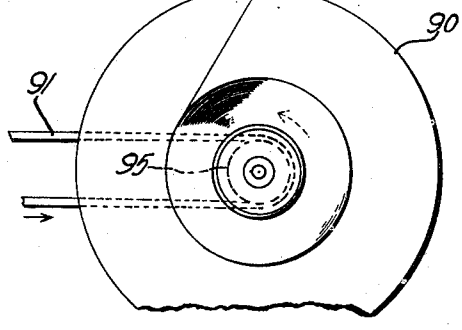


Fig. 9



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RIBBON FEED FOR TYPEWRITING MACHINES

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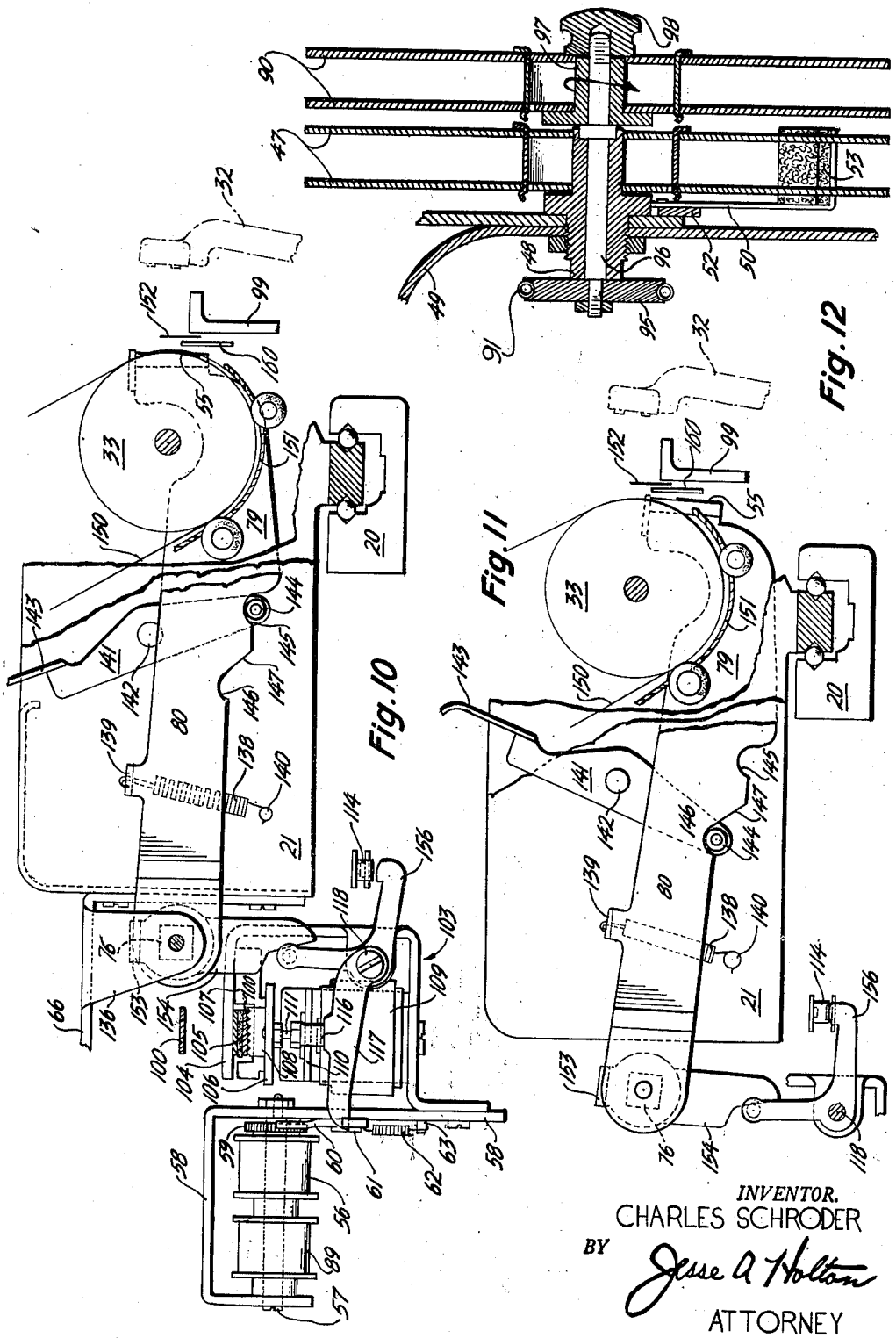


Fig. 10

Fig. 11

Fig. 12

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RIBBON FEED FOR TYPEWRITING MACHINES

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Fig. 13

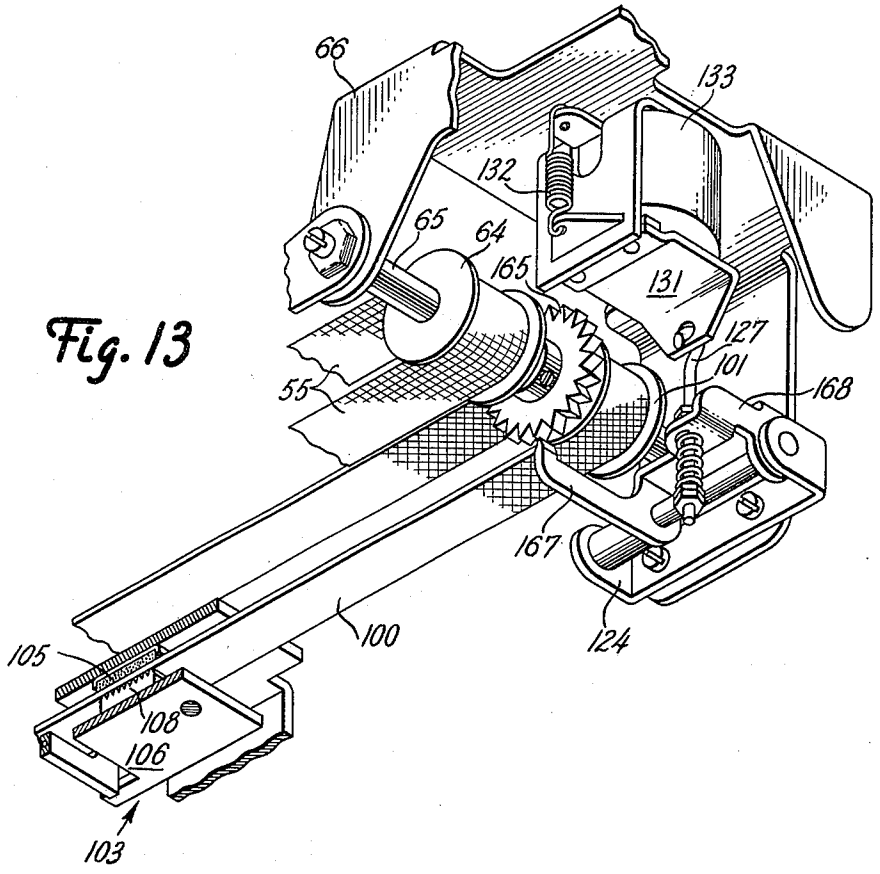
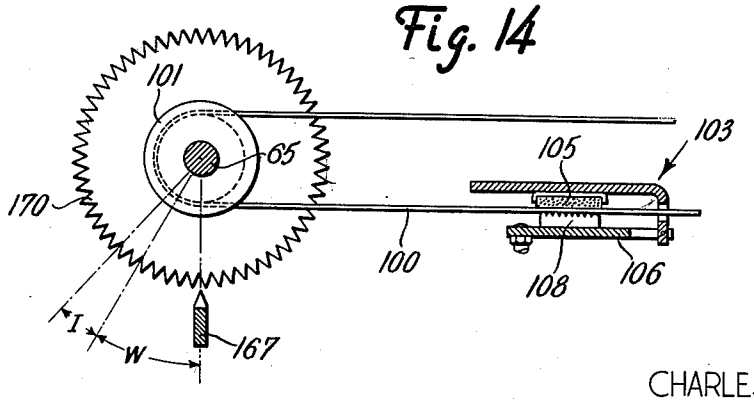


Fig. 14



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Patented Sept. 2, 1952 2,609,077

UNITED STATES PATENT OFFICE

2,609,077

RIBBON FEED FOR TYPEWRITING MACHINES

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Application October 22, 1949, Serial No. 122,948

33 Claims. (Cl. 197—151)

1

This invention is a continuation in part of my application Serial No. 790,806, filed December 10, 1947, and since abandoned, and relates generally to ribbon guiding and feeding mechanisms for typewriting or similar machines, and is of particular usefulness for preparation of master sheets in which hectograph or similar ribbons are used, particularly ribbons of paper having a side coated with transfer matter.

The machine of the invention is of the type wherein a ribbon is trained to take a course including the typing line on the carriage, and is supplied from a frame-supported supply spool or device, and is preferably taken up by a frame-supported take-up spool or device, and wherein means are provided to feed the ribbon along the typing line in step with the carriage in response to all typing operations, thereby to present an unused ribbon field at the printing point after every typing impression is made.

The machine of the invention may include also a ribbon mechanism of conventional design, embodying a ribbon vibrator at the printing point. This conventional ribbon mechanism and ribbon will be specifically identified as such when reference thereto is made hereinafter, and in all other instances the ribbon mechanism and ribbon spoken of herein is that of the preceding paragraphs.

In practicing spirit duplicating or offset duplicating processes, the matter typed on a master sheet is transferred successively to individual copy sheets. In the preparation of the master sheet a transfer ribbon is used which has a heavy deposit of transfer matter, such as hectograph ink. In typing, imprints from the types result from transfer of ink from the ribbon onto the master sheet. A heavy and uniform deposit of transfer ink is essential for subsequent proper reduplicative action of the master sheet, and for that reason, it has become common practice to build machines wherein only one type impression is obtained from any given area of the ribbon.

According to some duplicating processes the copies are made by transfer of ink directly from typed master sheets. The typed characters on the master sheet, in order to appear in legible aspect on the copies produced by the stated direct-method duplicative process, must be typed on the master sheet in mirror aspect. In order to obtain such mirror-aspect typing, there is preferably used a typewriter having standard types, mirror-aspect imprints being obtained from a ribbon having an ink coating facing the master sheet from the rear in the typewriter along the typing line of the carriage.

The ribbon feeding mechanism of the present invention is suitable especially for preparation of master sheets used for the direct-method duplicating processes, but the mechanism can

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also be used for making typing impressions of positive aspect on a work-sheet, the ribbon in that case being placed on the machine for it to stretch along the typing line at the front of the work-sheet and with the transfer coating facing rearwardly.

The paper ribbons used are necessarily frail and therefore are subject to fracture at the least abnormal stress. They are especially subject to fracture if the guiding means for the ribbon is of a nature that the stress is not distributed over the entire width of the ribbon, that is if the stress is greater along one of the two ribbon edges.

In the class of machines to which the invention relates, if the supply of ribbon is to last over a reasonable time, obviously the supply spool or means and the take-up spool or means must both have considerable ribbon holding capacity, wherefore the spools of ribbon necessarily must constitute considerable masses which are best carried on the frame, so as not to burden and encumber the movements of the carriage. Obviously, also, the lighter the paper of which the ribbon is made, the larger will be the ribbon holding capacity of the spools for a given diameter or mass thereof. There is also the consideration that for least stress on the ribbon during movement thereof, the size of the ribbon spool must be held to a minimum. In other words, the mass of a full ribbon spool must not be so great that undue resistance is offered thereby to the control and propagation of the ribbon through the machine. Also it must be realized that a light and thus easily flexible paper ribbon follows the bends of a changing course with less resistance, and, therefore, is easier to control accurately in its movements.

In view of the above stated facts, a ribbon mechanism of the stated kind primarily should be of a construction to subject the ribbon to the least possible strains, so that under normal conditions there are not apt to occur ribbon ruptures, and so that it is possible to use a ribbon of lightest weight and of least storage demand.

Also, for most economical use of the ribbon, a mechanism is desirable which will feed the ribbon past the typing point consequential to each typing impression a feed increment which is accurate or very closely in agreement with the letter-feeding steps executed by the carriage, so that there will be no intervening unused areas on the ribbon and also no repetitiously used areas. During all other movements of the work-sheet supporting carriage, either in letter-feeding or in return direction, the ribbon is preferably caused to remain stationary with respect to the printing point. Devices for control of the ribbon in the above manner are known in the art.

The known ribbon guiding and feeding means

of the general type referred to hereinabove however are all wanting in at least one or another structural or operational respect. For example, in one known machine the ribbon extends from the two spools to the carriage over guide means which are supported on big brackets which project laterally from the machine frame, and the feed control for the ribbon moreover is complicated.

In other known structures the ribbon feeding and guiding mechanism is such that the ribbon is subjected to critical stresses either across the entire width thereof or along one or the other opposite edges. The ribbon used in such prior machines must necessarily be of relatively thick, strong material to minimize the rupturing tendency, but even so, any slightest defect along either of the ribbon edges is apt to cause ribbon rupture. Use of heavier material on the other hand, as brought out hereinabove, reduces the ribbon holding capacity of the spools, and also has other disadvantages.

It is a general object of the invention to overcome the stated shortcomings of prior machines of the stated kind.

It is a further object of the invention to devise an improved ribbon mechanism of the kind stated, having a great ribbon supply and storage capacity and yet placing a minimum of strain on the ribbon.

Another important object is to provide a ribbon mechanism of the kind including frame-supported supply and take-up means for the ribbon, which mechanism is efficient in operation, subjects the ribbon to a minimum of strain, and is devoid of any ribbon supporting devices projecting objectionably from the frame.

Particularly in connection with the preceding object, it is also an object to devise the mechanism so that the strain on the ribbon is distributed over the entire width thereof, wherefore both ribbon edges will always be under equal and least possible strain.

Furthermore, it is an object to provide a reliably operative ribbon mechanism which has a compact and pleasing appearance, and at the same time has a maximum ribbon holding capacity.

In connection with any of the preceding objects, it is a further object to provide an efficient, reliably and accurately functioning device to feed and control the ribbon for presentation of a new and immediately adjacent transfer-field of the ribbon in response to each character typing operation.

An object of the invention is also to provide a ribbon mechanism of the stated class which is devoid of ribbon supporting projections reaching outwardly from the frame and wherein there are substantially no wasted movements of the ribbon from and to the ribbon spools, and wherein the ribbon is subjected to equal stress of minimum magnitude across its full width.

It is also an object to provide more positively acting means than heretofore to cause the ribbon to feed unitarily with the carriage in the carriage movements resultant from typing impressions.

Still another object is to provide efficient means to lower the ribbon which normally extends along the typing line of the carriage, to an idle, protected, out-of-way position below the writing line, thereby to condition the machine for use as a conventional typewriter.

It is still a further object of the invention to provide convenient disabling means for the ribbon, namely means to lower the ribbon to an idle protected position below the writing line, and concomitantly to condition the ribbon controlling or feeding devices for non-consumption of ribbon.

Other objects and features will be in part obvious and in part pointed out, particularly as the following description of a preferred embodiment of the invention proceeds.

In the embodiment of the invention herein described the ribbon-feed mechanism comprises a ribbon supply spool, an impositively, friction-driven ribbon take-up spool, carriage-carried rolls controlled for feeding the ribbon on the carriage during all movements of the carriage not instituted by typing, and means to cause non-rotation of said feed rolls during all letter-feed movements resultant from typing. The mechanism is so operative that the ribbon at the printing point of the type bars remains stationary with respect to the printing point during all carriage movements not caused by typing, such as tabulating, back-spacing, carriage return and word-spacing movements. On the other hand the ribbon moves bodily with the carriage during all letter-feed movements of the latter, so that in each such carriage movement a successive unused area of ribbon is brought to the printing point. Control means for said carriage-carried feed rolls are provided so that during any carriage movement caused by a typing operation, such feed rolls are held against rotation, keeping the ribbon stationary on the carriage, the carriage bringing a new field of ribbon to the printing point. At each letter-feed movement of the carriage, new ribbon is withdrawn from the supply spool, and used ribbon is payed off to the take-up spool. During all movements of the carriage which are not letter-feeding steps, said feed rolls are rotated by carriage travel and the ribbon on the carriage moves over guide means provided on the latter. The stated movement of the ribbon on the carriage is always equal to but directionally opposite to that of the carriage, so that the unused ribbon area next to the last used one in effect is maintained stationary opposite to the printing point, ready to be of service at the next typing stroke.

Referring now to the drawings:

Figure 1 is a right-hand side elevation of a typewriter embodying the invention, certain portions of the machine being omitted or broken away,

Figure 2 is a perspective view of the typewriter as viewed from the back thereof,

Figure 3 is a diagrammatic illustration of two ribbon-feed controlling electromagnets with their associated parts and wiring, most parts being illustrated as viewed from the rear, and a control switch being shown in side elevation as viewed in Figure 1,

Figure 4 is a diagrammatic illustration of the ribbon guiding and feeding mechanism as viewed from the back of the machine at a downward slant, the carriage being indicated in two different positions,

Figure 5 is an isometric detail view of a bracket carried by the left rear-end of the carriage and seen looking at an angle upwardly thereagainst, the bracket carrying certain parts of the ribbon-feed controlling mechanism,

Figure 6 is a fractional rear sectional view showing one of the ribbon guides with its supporting structure,

Figure 7 shows a sectional rear view of a belt-

drive constituting part of the ribbon-feed mechanism, taken approximately on line 7—7 of Figure 1, portions of some parts being broken away,

Figure 8 is a rear view taken approximately along line 8—8 of Figure 1, but some of the parts shown in Figure 7 are omitted from the showing,

Figure 9 is a rear view, similar to Figure 8, but some of the parts shown in Figures 7 and 8 having been omitted from the showing,

Figure 10 is a fragmentary side view showing the carriage from the left and with the ribbon guiding mechanism supporting the ribbon in effective position at writing line level,

Figure 11 is a view similar to Figure 10 with the ribbon guiding mechanism supporting the ribbon in idle position below the writing line,

Figure 12 is a sectional view vertically through the center of both the ribbon spools, along with the immediate supporting and controlling mechanism for the spools,

Figure 13 is a view similar to Figure 5 showing a modified structure, and finally,

Figure 14 is a diagrammatic front elevation of a detenting mechanism designed for use in a machine that is equipped with a proportional letter-feeding mechanism.

Referring now more particularly to Figure 1, the typewriter embodying the invention includes a usual main frame 20, the main frame supporting typing instrumentalities of a conventional design and having thereon a platen-supporting carriage 21 arranged to travel in typing and carriage return directions in a usual manner. The carriage is constantly urged in typing direction, leftwardly, by a conventional spring motor, not shown, and will letter-feed in that direction under control of a usual letter-feed escapement, not shown, the latter operated at each typing stroke.

The typewriter selected for illustration of the invention is the well-known commercial "Underwood All-Electric" machine, and for that reason will be described only briefly.

When the machine is in use, a toothed shaft 25 extending from side to side in the machine is continuously motor-driven. The motor drive to the shaft 25 includes a transmission unit indicated at 22, driving continuously a pulley 22*a*. Another pulley 24 is driven by said pulley 22*a* through the medium of an endless belt 23.

The machine has a usual complement of type keys, not shown, and each such type key is equipped with a hook-link, indicated at 25*a*, having association with an individual type action actuator or link 26 to lower the same into motion receiving engagement with the toothed shaft 25. Each actuator 26, upon being lowered, is imparted a power-motion towards the front of the machine, thereby to rock an arm 28 about a pivot 29, said arm 28 acting through its forward edge in a rolling engagement on a bell crank 30, to rock the latter counterclockwise about its pivot 31, and thereby to cause operation of an associated type bar 32 against a carriage-supported platen 33.

The machine includes at the front of the carriage 21 a conventional typewriter ribbon indicated at 152 in Figures 2, 10 and 11. The means for vibrating this conventional typewriter ribbon 152 comprises a transverse bail 34 extending and pivotally carried between the two side walls of the machine to rock about an axis indicated at 35, said bail overlying noses 36 of the various bell cranks 30, and being rocked clockwise at the operation of any type action by one of the noses 36. The bail 34 is biased downwardly by a spring 37 to rest normally against the noses 36, the spring 37 acting on an arm 38 that is fixed to the right end of the bail 34. The arm 38 carries at its lower end a pin 39 projecting therefrom laterally into a cam slot 42 of an arm 40 which is pivoted on and reaches rearwardly from a stud 41 in the frame 20. A vertical link or slide 45 has pivotal association with the rear end of the arm 40, said pivotal association being constituted by a pin 44 situated in a notch 43 of the arm 40. A spring 46 constantly urges the slide 45 upwardly to the normal position seen in Figure 1, such position being established by the bail 34 abutting the noses 36. At the upper end the slide 45 is connected at 46*a* to a part of the usual ribbon vibrator structure, not further shown, but effective normally to hold the conventional ribbon 152 below the printing point. Each operation of a type action, by operation of the bail 34, results in a downward movement of the link or slide 45 and a positioning of the vibrator to locate the ribbon 152 opposite the printing point, as indicated in Figures 10 and 11. The shape of the cam slot 42 in the arm 40 is such that the downward movement of the slide 45 takes place at the very initial portion of each type-bar operation, and, furthermore, is such that the slide 45 stays downwardly moved until the operated type action nears full restoration.

Every one of the type bars 32 by conventional means, not shown, operates a usual letter-feed escapement substantially at the time each imprint is made and causes an immediate letter-feed step of the carriage to ensue. In view of the shape of the cam slot 42, the slide 45 arrives in lowered, operated position before each letter-feeding step of the carriage commences, and stays thereat until after the carriage executes the letter-feeding step. This timing relation is important to the operation of the ribbon feed mechanism to be described later herein.

The slide 45 is operated consequential to typing only, and, as will become evident hereinafter, such operation is utilized to restrict feeding movement of the transfer ribbon with respect to the printing point to letter-feed movements of the carriage, that is movements instituted by typing operations.

General description of the ribbon feed mechanism

As shown best in Figures 1 and 2, a ribbon supply spool 47 and a ribbon take-up spool 90 are preferably mounted on in back of the other, midways on the back of the typewriter. The ribbon 55 extends from the supply spool 47 over a frame-supported guide roll 56 to a ribbon feed roll 64 on the left-hand end of the carriage 21, thence along the back of the carriage to a ribbon guide or training element 71 on the right-hand carriage end. From there the ribbon 55 extends forwardly over a front-guide 78 at the same carriage end and along the writing line of the carriage, past the printing point, to a guide 81 at the left carriage end which trains it rearwardly. At the back of the left-hand carriage end the ribbon is trained over another guide 84 to extend across the back of the carriage to a ribbon feed roll 85 on the right-hand end of the carriage and over the latter roll in a direction reversing manner leading it to the take-up spool 90 by way of a frame-supported roll 89.

A substantially non-stretching endless belt 100 of rubber-coated fabric or the like, connecting operatively said feed rolls 64 and 85, is controlled

normally by a releasable frame-supported clamp designated generally by 103, to rotate the feed rolls 64, 85 during travels of the carriage not accompanied by typing, to the end of moving the ribbon on the carriage to keep it stationary at the printing point.

The belt 100 is released from control of said clamp 103 at each typing operation and is then stationary on the carriage so that the ribbon feed rolls 64, 85 do not then turn, and so that fresh ribbon is drawn off the supply spool 47, and so that used ribbon is payed onto the take-up spool 90. The used field of ribbon under these conditions moves to the left of the printing point at each typing stroke, bringing an unused adjacent field opposite the printing point.

It should be noted that the approach span of ribbon extends in letter-feed direction from the frame-supported roll 56 to the carriage-carried ribbon feed roll 64 in order that ribbon will be drawn off the supply spool 47 always as the carriage executes a typing step. Similarly, the leaving span of ribbon extends from the carriage-carried feed roll 85 to the frame-carried roll 89 in the direction of letter-feed movement in order that ribbon is payed off to the take-up spool 90 whenever the carriage executes a typing step. Ribbon is thus drawn off the spool 47 and payed onto spool 90 in small increments agreeing with the typing steps of the carriage.

From Figure 4, particularly it will be perceived that the supply spool 47, the frame-supported roll 56, and the carriage-supported feed roll 64 are all arranged on parallel axes and are all located in a common plane which is parallel to the movement of the carriage. It will also be perceived that the take-up spool 90, the frame-supported roll 89 and the carriage-carried feed roll 85 turn all on parallel axes and are all located in a common plane which is rearwardly of the plane in which the supply spool 47 and rolls 56, 64 lie. Furthermore the diagonal guides 71, 84 each train the ribbon into one of said planes. The ribbon stretches leading oppositely inwardly from said diagonal guides, although substantially laterally coextensive on the carriage, nevertheless do not conflict with each other. Obviously, in the stated arrangement, no matter to what position the carriage 21 may be moved, the approach span of ribbon between the roll 56 and the feed roll 64 will always be in a planar, non-twisted condition, and similarly, the leaving span of ribbon between the feed roll 85 and the roll 89 will always be in a planar non-twist condition. Moreover, the ribbon 55 passes over the carriage-carried feed rolls 64, 85 and over the frame-supported rolls 56, 89 in full-face contact therewith, and for this reason, and in view of the always existing planar, non-twisted condition of the stated ribbon spans, the ribbon is equally strained over the entire width in any position of the carriage, and especially neither of the opposite edges thereof receives the brunt of the strain. The ribbon which is necessarily rather frail, will thus withstand the greatest possible stresses without fracture. It will further be noted that each of the frame-supported rolls 56, 89 can be mounted on the frame in the closest possible lateral relation to the carriage-carried feed roll on the other end of the related ribbon span, just so long as each ribbon span is never totally exhausted in the full range of carriage travel.

The spool 47 containing the unused supply of ribbon, see Figures 8 and 12, is mounted freely rotatably on a sleeve 48 which projects fixedly from the rear of the typewriter casing 49 at the middle thereof. A brake arm 50 for the supply spool 47 is pivoted at 51 on a bracket arm 52 fixedly mounted on the rear casing and carries a friction pad 53 of suitable friction characteristic to retard lightly the spool 47. The arm 50 with its pad 53 is resiliently urged against the periphery of the supply spool 47 by means of a spring 54 extending between the arms 50 and 52, the structure serving to prevent excessive unreeling of the ribbon from the spool 57 whenever some ribbon is pulled therefrom.

From the supply spool 47, see particularly Figures 1, 2, 10 and 12, the ribbon 55 passes over a guide roll 56 just above the spool. Said guide roll 56 is rotatable on a rod fixedly projecting rearwardly from a bracket 58 that is secured to the rear wall of the casing 49. A ratchet wheel or disk 59 fixed or unitary with the inner end of the roll 56, and a pawl 60, the latter pivoted on a screw 61, cooperate normally to hold the roll 56 against rotation, so as to oppose the drawing of ribbon over the roll from the spool 47.

A spring 62, arranged between a rightwardly extending arm of pawl 60 and a stud 63 on bracket 58, urges the pawl resiliently into engagement with the ratchet wheel 59. As will be described later under the heading "Details of clamp and clamp controlling mechanism," the pawl 60 is released from the ratchet wheel 59 at each printing operation to permit ribbon to draw off the spool 47 during the letter-feeding step.

The ribbon 55, as shown in Figures 2, 4 and 8, extends in a span of approach to the carriage, from the roll 56 to the left-hand end of the carriage, which leads in the letter-feeding travel, and is there reversed in direction around the carriage-carried feed roll 64. The latter is unitarily rotatable with a shaft 65 that pivots on pins 87 which are screwed fast in a bracket 66, the latter carried rigidly on the left rear end of the carriage 21. A pressure roll 67 supported freely rotatably on a pivoted arm 68, see also Figure 9, by reason of its weight, bears with light pressure on the feed roll 64, thereby to hold the ribbon 55 frictionally coupled to the roll 64. The pressure roll 67 and the feed rolls 64 and 85 are preferably circumferentially lined with a soft, rubber-like material. The ribbon 55 for that reason does not slip on the rolls 64 and 85 and there is sufficient resistance present against the turning of these rolls that the ribbon will travel without moving on the carriage whenever the feed rolls are not forcibly turned by the belt 100. The arm 68 is pivoted at 69 to an upstanding arm of a bracket 70 secured to the rear end of the bracket 66, see Figure 9.

From the feed roll 64, the ribbon 55 extends along the back of the carriage to a diagonal guide 71 carried on a bracket 72 which is mounted at the rear of the right end of the carriage. The guide 71 gives a change of direction to the ribbon for it to extend forwardly just outside of the right end of the carriage 21. An idler roll 73 forward of the guide 71, see Figure 6, is arranged at an appropriate level so that both edges of the ribbon are equally stressed. Said idler roll 73, see Figure 6, is freely rotatable on a stud 74 screwed into a plug 75 that is fast in the end of a square tube 76, said tube being part of a bail structure to be described later. Another idler roll 77, forwardly of the idler roll 73, cooperates with the latter to pass the ribbon below the extending shaft of the platen 33. From the idler

roll 77, the ribbon extends upwardly to the front guide 78 which is diagonal in nature to train it to extend further along the front side of the platen 33. The idler roll 77 and the guides 78 are carried near the front end of an arm 79 which is fixed to the square tube 76, and said arm 79 is capable of pivotal downward displacement about the plug 75 which projects from the tube, thereby to lower the ribbon 55 at the front of the platen to an inactive position, as will be more fully described under the heading "Disabling ribbon feed mechanism."

On the left end of the carriage 21, an arm 80, generally similar to arm 79, is fixedly carried on the other end of the tube 76, and supports the guide 81 and an idler roll 82, said guide 81 being diagonal in nature, for the ribbon to turn thereover to extend downwardly and further around the bottom of said idler roll 82, rearwardly below the projecting platen shaft and over an idler roll 83. The latter idler roll is mounted to project from the left end of the tube 76 in the same manner and for the same purpose as the roll 73 on the other end of the tube. Directly behind the idler roll 83 and fixed in the bracket 66 is a diagonal guide bar 84 over which the ribbon 55 is trained in a direction changing manner to extend along the rear of the carriage to the feed roll 85 at the right carriage end which is carried fast on a shaft 86 and trails in the letter-feeding travels, said shaft being rotatively carried on pivot pins 88 secured in the bracket 72 which is at the right end of the carriage. Similar to the feed roll 64, the feed roll 85 may also have a pressure roll 67 associated therewith, but none is shown. The ribbon further extends in a direction reversing turn about the feed roll 85 and then in a ribbon pay-off span onto the guide roll 89 which preferably is carried unitarily rotatably with the roll 56 on the rod 57. From said roll 89 the ribbon leads downwardly onto the take-up ribbon spool 90 which is preferably concentrically arranged with the supply spool 47. In the stated arrangement of the various guides for the ribbon, the set of ribbon guides 71, 73, 77 and 78 at one end of the carriage, and the set of guides 81 to 84, inclusive, at the other end of the carriage, constitute each broadly a means to train the ribbon from the typing line to extend in a turn inwardly.

A friction drive associated with the take-up spool 90 continuously urges the latter impositively in its winding direction, that is in counterclockwise direction as viewed from the rear, just with enough force to take up any ribbon that may be payed off to it, and thus prevents any looping or irregular gathering of the ribbon which might result in fracturing of the ribbon. Said friction drive, see Figures 1, 2 and 12, comprises an endless belt 91 which when the machine is in use tends always to drive a pulley 95 which is fixed to the front end of a shaft 96 concentrically of which both ribbon spools are arranged. The shaft 96 is turnably accommodated in a sleeve 48 which mounts the supply spool 47, and has an enlarged portion accommodated in an annular recess in the rear end of the sleeve 48. Said enlarged shaft portion cooperates with the pulley 95 to locate the shaft 96 endwise. For accommodating the take-up spool 90, a bushing 97 is placed on the shaft, and both the take-up spool 90 and the bushing 97 are removably clamped fast on the shaft by means of a knurled nut 98, the spool being forced axially against an enlarged portion of the bushing 97, and the bushing in turn against the enlarged shaft portion. The belt 91 is driven from a small pulley 92 provided on the shaft which reaches outwardly from the machine transmission 22, said small pulley being just inside of the pulley 22a. Between the pulley 92 and the pulley 95 the belt 91 is led at substantially right angles over a pair of guide pulleys 93 mounted on a bracket 94. Said belt is made of a selected material so as to transmit only a very light torque to the pulley 95, the belt readily slipping on the pulley 95 if there is no loose ribbon to be wound on the spool 90. The belt for this desired characteristic may consist of a light coil spring.

Referring particularly to Figures 2 and 4, the belt 100 which causes the ribbon feed rolls 64 and 85 to turn during all carriage movements which are not resultant from typing, is stretched over two pulleys 101 and 102, pulley 101 being fixedly carried on the shaft 65 having the feed roll 64 thereon, and pulley 102 being fixedly carried on the shaft 86 having the feed roll 85 thereon. The frame-supported clamp generally designated by the numeral 103 is in gripping engagement with the lower stretch of the belt 100 at all times except incidental to typing operations. Whenever the carriage 21 is moved rightwardly or leftwardly with the clamp 103 applied, the pulleys 101, 102 travelling with the carriage will be driven by the belt, clockwise as viewed from the rear when the carriage travels in letter-feed direction, and oppositely when the carriage travels counter to letter-feed direction. The diameter of the pulleys 101, 102 as compared with the ribbon feed rolls 64, 85 is identical, so that the peripheral movement of these rolls 64, 85 is in exact agreement with the lineal motion of the carriage. Furthermore, the round about course of ribbon on the carriage and the arrangement of the clamp provides that in carriage movements which are not caused by typing, the ribbon is moved on the carriage by the feed rolls 64, 85 always directionally correct at the writing line and at an appropriate rate of speed to maintain the last-used ribbon area stationary with respect to the printing point and without causing any movement of the spools 47 and 90. Also the feed rolls 64 and 85 at opposite ends of the carriage will pay off or take up ribbon, whichever is required, and at appropriate speed, to keep the approach span and leaving span of ribbon just taut, this being accomplished without drawing ribbon off or paying ribbon onto the spools.

In view of the small rotative movements which the spool 47 receives, such spool will never overrotate and thereby create slack in the ribbon. Also the inertia set up in the take-up spool 90 as a result of the typing step of the carriage will never be great enough to influence the accuracy of ribbon control or to cause breakage of the ribbon when a typing movement abruptly terminates.

Details of clamp and clamp controlling mechanism

Referring particularly to Figures 1, 2, 3, 7 and 10, the clamp 103 for the belt 100 is laterally about at the middle of the machine frame and comprises an upper, stationary jaw 104 which is fixedly mounted on the frame and is provided with a friction pad 105 of suitable material. A lower clamp member 106 is hingedly mounted on a pendant arm 107 of the clamp jaw 104, and is provided with a serrated pad or plate 108 opposite the stationary pad 105. A spring 112 urges the clamp member 106 normally upwardly, so that the lower band of the belt 100 is normally

gripped fast between the clamp pads 105 and 108. An electromagnet 109 having a hinged armature 110 is mounted on the stationary portion of the clamp 103 and is adapted to be activated to release the lower clamp member 106. A stud 111 connects said lower clamp member 106 for operation by the armature 110. The magnet 109 when energized attracts the armature 110 and releases the clamp member 106 from the belt 100, movement of the carriage with the belt 100 so freed causing the ribbon 55 on the carriage to move bodily along with the carriage.

As has been pointed out previously, movement of the ribbon bodily with the carriage should occur only in connection with movements of the carriage which accompany a printing operation. To this end means are provided to close the electric circuit of magnet 109 consequential only to typing operations. As shown in Figures 1 and 3 the circuit for the magnet 109 includes two switches 113 and 114. The switch 114, as will be pointed out hereinafter, is in closed condition whenever the ribbon 55 is in use. The switch 113 is normally open, but is closed at every typing stroke by a pin 115 projecting from the slide 45 of the previously described ribbon vibrating mechanism for the conventional typewriter ribbon 152. It will be remembered that the slide 45 is actuated downwardly only incidental to typing operations. Downward movement of the slide 45, through the pin 115, closes the switch 113 to energize the magnet 109 and thereby release the clamp member 106 from the belt 100. As has been stated before, the operation of the slide 45 is timed so that it is in operated position for the duration of every typing step which the carriage takes. It follows thus that the clamp member 106 is in released position during any typing step of the carriage, and that the feed rolls 64 and 85 in moving bodily with the carriage, carry the ribbon 55 on the carriage bodily therewith.

As has been previously pointed out, the frame-supported rolls 56 and 89 are normally held against rotating by the pawl 60 engaging the ratchet wheel 59. However, these rolls should be free to rotate during all letter-feeding steps of the carriage resultant from typing, that is when the ribbon on the carriage moves with the carriage. To this end the pawl 60 is disengaged from the ratchet wheel under control of the magnet 109 which releases the belt clamp 103. As shown in Figures 7 and 10, the hinged armature 110 of magnet 109 is provided with a downwardly turned gooseneck extension 116. The lower end of this gooseneck 116 overlies an arm 117 pivoted on a stud 118 in an ear of the clamp unit 103. The rear end of the arm 117 overlies a laterally extending arm of the pawl 60, it being remembered that the spring 62 associated with the pawl 60 keeps the same normally active. Whenever the magnet 109 pulls the armature 110 down to release the clamp 106, the gooseneck of the armature 110, by operating the arm 116 downwardly, rocks the ratchet pawl 60 free of its associated ratchet wheel, thereby to free the rolls 56 and 89 for rotation. Thus during typing steps of the carriage but not otherwise, the ribbon 55 travels freely over the frame-supported rolls 56, 89.

The resistance offered to movement of the ribbon 55 over the various guiding means on the carriage 21 is ordinarily sufficient to cause the ribbon 55 to move with the carriage in all letter-feeding steps resultant from typing operations, that is in steps of the carriage when the belt clamp 105, 108 is released. However, to assure movement of the ribbon 55 in accurate step with the carriage, an auxiliary clamp 119 is provided on the right carriage end which during the stated letter-feeding steps of the carriage renders the belt 100 immovable on the carriage 21 and consequently the feed rolls 64, 85 will be held against turning. This auxiliary clamp 119, see Figures 3, 5 and 7, is operated by an electromagnet 133 which is connected in series with the electromagnet 109. This auxiliary clamp comprises a bail 122 having an arm 121 provided with a friction shoe 120 of suitable frictional material. The shoe 120 stands normally clear of the belt 100 but is operable thereagainst at the location of the pulley 101. The shoe 120 will then prevent movement of the belt 100 on its supporting pulleys and consequently will hold the ribbon feed rolls 64 and 85 against rotation. Said bail 122 pivots on a fulcrum rod 123 which is mounted in a bracket 124 that is secured to the left-hand carriage bracket 66. Another arm 125 of the bail 122 is formed with a horizontal ear 126 having an upright wire-link 127 articulated thereto in a perforation. The upper end of the wire-link 127 is formed into a hook and is articulated to a hinged armature member 131 of a magnet 133. A spring 132 urges the armature 131 to occupy normally a position away from the magnet 133, and the clamp shoe 120, through the medium of the link 127, is normally held free of the belt 100. The electromagnet 133 is mounted on the lower side of the bracket 66. When the magnet 133 is energized, the armature 131 moves upwardly, rocking the bail 122 to move the shoe 120 against the belt 100, as stated before. The articulation of the wire-link 127 to the ear 126 is preferably resilient in nature, in order that after application of the friction shoe 120 the armature may move into contact with the core of the magnet 133, the magnet 133 producing less humming noise under such condition. Accordingly, a compression spring 129 is provided between the ear 126 and an adjustable spring seat on the wire-link 127 constituted by two nuts 130, the link 127 thus operating the clamping bail 122 through the medium of the spring 129. Overlying the ear 126, the wire-link 127 has an adjustable shoulder provided by a pair of nuts 128. Thus when the armature 131 is returned by the spring 132, the shoulder provided by the nuts 128 forces the bail 122 to released position.

The electrical circuit of the magnet 133 includes a two-wire flexible cable 134 which extends from the two terminals of a magnet 133 to a junction block 135 mounted on the typewriter frame 20, whereat the two individual wires of the cable 134 are connected in parallel with those from the magnet 109, for conjoint energization of the magnets 109 and 133. The cable has a free loop as indicated in Figure 3 to allow free movement of the magnet 133 along with the carriage. One terminal of the block 135 is connected directly to one side of the power source, while a lead from the other terminal to the other side of the power source includes in series the aforestated normally closed switch 114, and the switch 113 operable by the type actions.

Thus, both the magnets 109 and 133 are energized each and every time the switch 113 is closed by operation of a type action, wherefore not only the clamp 103 for the belt 100 is released but concomitantly clamp 119 is applied to hold the

belt 100 against movement on the carriage to the stated end.

Disabling the ribbon and ribbon feed mechanism

In order to have the typewriter readily convertible for conventional use employing only the usual ribbon 152, means are provided for displacing the ribbon 55 to a respective position below the writing line. Also to this same end means are provided for simultaneously disabling the ribbon feed controlling mechanism. It will be remembered that the front ribbon guides 78 and 81 as well as the forward idler rolls 77 and 82 are mounted on spaced arms which with a connecting tube 76 constitute a pivoted bail structure. This bail structure, by means of the plugs 75 projecting from the opposite ends of the tube 76, is rotatively mounted in pivot holes provided in ears 136 and 137 bent downwardly from the brackets 66 and 72 at the opposite end of the carriage. Near the front ends each of the arms 79, 80 is given guidance, and thus lateral support, by a stud 143 which projects rigidly from the adjacent carriage end, the arms having each a slot for movement limiting and guiding coaction with one stud.

Referring now more particularly to Figures 2, 10 and 11, the bail structure comprising the arms 79, 80 is biased to swing downwardly by a spring 138 arranged between a lug 139 on the arm 80 and a stud on the carriage, the bail against the urge of the spring being normally held in the position seen in Figures 1, 2 and 10, wherein the ribbon 55 along the front of the platen is positioned at writing line level. A lever 141 pivoted on a stud 142 which is fixed in the left end of the carriage, has at its upper end a finger piece and has at its lower end a leftwardly extending roller 144 against which the bail arm normally rests under the tension of said spring 138. The bail arm 80 is notched as at 145 to form a detent wherein the roller 144 is normally accommodated. The arm 80 is notched at a higher level 146 so that when the control lever 141 is given a forward tilt the bail will move to a lower position under the urge of the spring 138, see Figure 11. Intermediate the notches 145, 146 there is a connecting cam face 147, the roller 144 gliding along the cam face as lever 141 is moved to either position. In the lower position of the bail illustrated in Figure 11 the ribbon 55 is located below the typing line far enough for work sheets introduced from the rear around the underside of the platen to move at the front edge of the paper guide 151 upwardly above the ribbon. It will be noted that the ribbon moves down in front of the front edge of the paper guide 151 into a protected out-of-way position behind a carriage-carried paper scale 160.

When the ribbon 55 is in effective position at the writing line, a work sheet 150 introduced from the rear will be directed by the paper guide 151 at the front of the platen in a path forwardly of the lower edge of the ribbon 55 but in back of the conventional ink ribbon 152, that is between the two ribbons. Under these conditions typing impressions will be made on the back of the work sheet 150 through the medium of the ribbon 55, and will be made on the front of the same work sheet through the medium of the ribbon 152.

Inasmuch as it is desirable to prevent waste of ribbon 55, means are provided to disable the feed means for the ribbon during such times as the ribbon is placed in the ineffective position. The tube 76 of the ribbon supporting bail carries for this purpose in slidably splined association thereon a short bail 153 having a depending limb 154 passing vertically through a slot 155 in the jaw 104 of the clamp unit 103. The limb 154 normally rests in front of an upstanding arm of an L-shaped lever 156 pivoted on the stud 118. A forwardly extending arm of the lever 156 underlies the movable contact of the normally closed switch 114. Whenever the ribbon-carrying bail is moved down to disable the ribbon 152, the square tube is given a counterclockwise rotation with respect to Figure 10, resulting in the operation of the bail 153 and further in the operation of the lever 156 which opens the switch 114. The latter, it will be remembered, is in the supply circuit for magnet 109 and 133, and hence so long as this switch 114 is held open there can be no energization of these magnets, and the ribbon feed rolls 64 and 85 are then active during any and all carriage movements, including typing steps, to maintain the ribbon 55 stationary with respect to the printing point, ready for use when the ribbon supporting bail is again placed in upper position.

Referring now to Figure 13 the machine may be provided with a feed roll detenting device in substitution for the clamp 121. Said detenting device comprises a wheel 165 rotatable as a unit with the feed roll 64 and having V-shaped notches spaced circumferentially at angular intervals which are in agreement with the desired angular movements of the feed roll 64 at the letter-feed steps of the carriage. A detent member 167 normally stands clear of the wheel 165 but at each typing stroke of the machine is forced into whichever notch of the wheel happens to reside approximately opposite thereto. Said detent member 167 is operated in the same manner as the beforedescribed clamp 121, for which it is substituted, and constitutes a part of a bail 168 similar to the bail 122. The bail member 168 is operated by the magnet 133, just as the clamp-bearing bail 122 for which it substitutes. Therefore, incidental to every typing stroke the detenting member 167 is forced upwardly into one of the notches of the wheel 165, and should such a notch not be directly opposite it, the detent will enforce a slight repositioning of the wheel, it being understood that the frame-supported clamp 103 is at that time not in control of the belt 100. Obviously, the detenting member 167 also, when applied, forces the ribbon on the carriage to move therewith, and in this regard gives the same result as the clamp 120. During tabulations or carriage returns or other non-typing movements of the carriage of great extent, the belt 100 held by the clamp 103 may under adverse influences turn the ribbon feed rolls 64, 85 slightly out of agreement with the distance traversed by the carriage, resulting in a slight creep of the ribbon with reference to the printing point. Such creep of the ribbon, if contra to letter-feed direction, might bring the last used ribbon area partially opposite the printing point. This slight creep however is corrected when the detent member 167 at the first subsequent typing operation is operated. The said detent member 167 for such action enters the wheel notch approximately opposite thereto and by camming action causes a correction in the position of the detenting wheel and thus the feed rolls 64, 85. The stated correction in the position of the ribbon takes place in advance of the type striking the work sheet so that an unused portion of the ribbon is at the printing point.

In Figure 14, which is a front view, there is shown a structure similar to the one shown in Figure 13, but suitable for use in a machine having a proportional letter-feeding mechanism. The feed of the carriage in machines having proportional letter-feed mechanism is usually in variable multiples of a basic feeding unit, the multiple depending on the breadth of the character printed. Accordingly, a detent wheel 170 has notches substantially spaced at angular intervals which at the periphery of the feed roll 64 are in agreement with the size of such basic feeding unit. The said wheel 170 is of a larger diameter than the wheel 164 in order that the V-shaped notches therein may be of appreciable size. The detent member 167 forcibly enters the notches of this wheel 170 at every typing stroke before the imprint is made, and leaves the notch after the carriage has executed the full letter-feeding motion. In entering the wheel notch approximately opposite thereto, the detent 167 causes a correction in the position of the ribbon similarly as stated in connection with Figure 13, and also assures that the ribbon on the carriage moves bodily with the carriage during any letter-feeding step.

Closing remarks

The ribbon guide means of the invention provide a course for the ribbon which places a minimum of strain on the ribbon at all times, and such parts of the ribbon guide means as are frame-carried are entirely within the lateral confines of the frame. However, the feed rolls 64, 85 do not turn very freely in view of the belt 100 which is stretched over the pulleys 101, 102. In conjunction with this condition, the resistance to movement of the ribbon over the various guide means on the carriage is sufficient for the ribbon to travel with the carriage whenever the latter travels with the belt clamp 103 and the pawl 60 released. To assure movement of the ribbon on the carriage even under adverse conditions as when for some reason or other the supply spool 47 or the rolls 56, 89 are not turning freely, the carriage-supported clamp 120 or the feed roll detent 167 is provided, either of which in effect locks the ribbon feed rolls 64, 85. In any event the ribbon on the carriage feeds bodily with the carriage during typing steps of the latter, and at each such step an increment of fresh ribbon equivalent to the size of the typing step is withdrawn from the supply spool 47, and an equal increment of used ribbon is payed off to the take-up spool 90. The belt clamp 103 is normally in applied condition and also whenever the carriage 21 is given a movement not accompanied by a typing operation. On the other hand, the carriage supported clamp 120 or the feed roll detent 167 is in released condition whenever the belt clamp 103 is in applied condition, wherefore during all carriage movements which are not resultant from typing, the feed rolls 64, 85 rotate, the ribbon travelling on the carriage over the guides to move along the writing line of the carriage reversely to the movement of the carriage, thereby keeping the ribbon stationary with reference to the printing point. The frictional contact of the ribbon on the feed rolls 64, 85, under assistance of the pressure roll 67, is sufficient to feed the ribbon reliably through the carriage. The detent pawl 60 and the rollers 56, 89, as well as the carriage-carried clamp 120, or the detent 167, are not essential to proper operation of the ribbon feed, but merely assure perfect operation under abnormal operational friction conditions such as a stickiness of parts.

It is to be understood also that the control of the feed may be effected differently than featured herein, and need not necesarily be type-action controlled. In general, portions of improvements may be used without others and variations may be resorted to within the scope of the invention.

Having thus described my invention, I claim:

1. The combination in a typewriting machine having a paper-supporting carriage movable laterally on a frame in a letterfeed and in return directions, to extend from the frame to either side, and having means to support a transfer ribbon to extend along a typing line on the carriage, one end of the carriage leading and the other trailing in letter-feed travels of the carriage, of means on the carriage to train said ribbon at each end of the carriage from the typing line to extend in a turn inwardly, frame-supported ribbon supply means arranged to pay off ribbon in a span of approach to the carriage, reaching always from the ribbon supply means to the leading carriage end outwardly thereto and in a plane parallel to carriage movement, frame-supported ribbon take-up means arranged to take up ribbon reaching thereto always in a leaving span reaching inwardly from the trailing carriage and in a plane parallel to carriage movement, ribbon guide means on the leading carriage end, located for said approach span of ribbon to span thereto in the assigned plane and for the ribbon to extend with equally strained edges in a turn toward where it extends inwardly trained from the typing line at the trailing carriage end, said guide means including means for said approach span to reach thereto from the supply means in substantially a planar, non-twisted condition, and a second ribbon guide means on the trailing carriage end for the ribbon to extend thereto from where it is trained inwardly at the leading carriage end and to extend further with equally strained edges in a turn leading into said leaving ribbon span, said second ribbon guide means located for the ribbon to lead into the leaving span in the plane assigned to the latter, and including means for said leaving span to reach from the second ribbon guide means to the take-up means in substantially a planar, non-twisted condition.

2. The invention set forth in claim 1, said ribbon supply means arranged to pay off ribbon in one specific plane, and the ribbon take-up means arranged to take up ribbon in a plane different from that in which the ribbon is payed off from the supply means.

3. The invention set forth in claim 1, said two ribbon guide means comprising each a roll over which the ribbon passes, and means to mount said rolls of each guiding means to turn on an axis which extends transversely of the plane in which the related ribbon span is situated.

4. The invention set forth in claim 1, said ribbon supply means including a rotatable ribbon supply spool in the plane of the approach span of ribbon, and said ribbon take-up means including a rotatable ribbon take-up spool in the plane of the leaving span of ribbon.

5. The invention set forth in claim 4, said two ribbon spools mounted coaxially laterally midways of the machine frame.

6. The invention set forth in claim 1, said supply means and said take-up means including each a ribbon guide on the frame located for said two spans of ribbon to extend in said planes always

parallel to the carriage, said two ribbon guides located substantially at the middle of the machine.

7. The invention set forth in claim 1, each of the two ribbon training means comprising means to train the ribbon to reach rearwardly from each typing line end, and comprising further at the rear of the carriage a diagonal guide for training the ribbon in a 90° inward turn to extend therefrom inwardly in planar condition substantially in a horizontal plane.

8. The invention set forth in claim 1, the machine including frame-supported typing instrumentalities to effect imprints at a typing point at the typing line, means to letter-feed the carriage incidental to effecting imprints by said typing instrumentalities, and ribbon control means to cause the ribbon on the carriage to move bodily with the carriage whenever incidental to a typing impression the carriage executes a letter-feeding step, and to cause the ribbon during other carriage movements to remain stationary at the printing point and to move on the carriage in a path prescribed by said guiding and training means, ribbon being drawn off the supply means and payed onto the take-up means whenever the carriage executes a letter-feeding step resultant to the typing instrumentalities effecting an imprint.

9. The invention set forth in claim 1, the machine including frame-supported typing instrumentalities to effect imprints at a typing point at the typing line, means to letter-feed the carriage resultant to effecting imprints by said typing instrumentalities, at least one of said guide means comprising a ribbon feed roll, carriage-operated means to rotate said roll oppositely by opposite carriage travels, and means to control said rotating means to cause the ribbon on the carriage to move bodily with the carriage whenever resultant to effecting typing impression the carriage executes a letter-feeding step, and to cause the ribbon during other carriage movements to move on the carriage in a path prescribed by said guiding and training means directionally correct to remain substantially stationary at the printing point.

10. The combination in a typewriting machine having a paper-supporting carriage movable laterally on a frame in letter-feed and in return directions, to extend from the frame to either side, and having means to support a transfer ribbon to extend along a typing line on the carriage, one end of the carriage leading and the other trailing in letter-feed travels of the carriage, of means on the carriage to train said ribbon at each end of the carriage from the typing line to extend in a turn inwardly, frame-supported ribbon supply means arranged to pay off ribbon in a span of approach to the carriage, reaching always from the ribbon supply means to the leading carriage end outwardly thereto and in a plane parallel to carriage movement, frame-supported ribbon take-up means arranged to take up ribbon reaching thereto always in a leaving span reaching inwardly from the trailing carriage end in a plane parallel to carriage movement, a ribbon guide means on the leading carriage end, located for said approach span of ribbon to span thereto in the assigned plane and for the ribbon to extend in a turn toward where it extends inwardly trained from the typing line at the trailing carriage end, a second ribbon guide means on the trailing carriage end for the ribbon to extend thereto from where it is trained inwardly at the leading carriage end and to extend further in a turn leading into said leaving ribbon span, said second ribbon guide means located for the ribbon to lead into the leaving span in the plane assigned to the latter, at least one of said ribbon guide means comprising a ribbon feed roll, carriage-operated means to rotate said feed roll oppositely by opposite carriage travels, and means to control said rotating means to cause the ribbon on the carriage to move bodily with the carriage whenever resultant to effecting a typing impression the carriage executes a letter-feeding step and to cause the ribbon during other carriage movements to move on the carriage in a path prescribed by said guiding and training means directionally correct to remain substantially stationary at the printing point.

11. The invention set forth in claim 10, said ribbon supply means arranged to pay off ribbon in one specific plane, and the ribbon take-up means arranged to take up ribbon in a plane different from that in which the ribbon is payed off from the supply means.

12. The invention set forth in claim 11, said ribbon supply means and said ribbon take-up means comprising each a spool, and said spools mounted within the lateral confines of the machine frame.

13. The invention set forth in claim 10, said supply means and said take-up means including each a ribbon guide on the frame located for said two spans of ribbon to extend always parallel to the carriage movement.

14. The invention set forth in claim 10, the machine including a wheel rotatable with said ribbon feed roll and having tapering notches laterally spaced with reference to the periphery of said roll in agreement with the unit spaces in which the carriage letter-feeds, and a detent operable on the carriage to enter whichever of said tapered notches may be approximately opposite thereto, said detent by camming action on the tapered notch correcting the position of the feed roll and thus the ribbon, and subsequently holding the roll against turning.

15. The invention set forth in claim 10, and means to hold said feed roll against rotation whenever resultant to typing the carriage executes a letter-feeding step.

16. In a typewriter having a frame, and a traveling paper carriage thereon, the combination of a plurality of ribbon guides carried by said carriage for directing a ribbon about said carriage in a path which includes the two sides of said carriage and the entire typing line, a ribbon feed roll at each rear corner of the carriage, each said feed roll positioned to receive ribbon from the one of said guides at the opposite end of said carriage, means connecting said feed rolls for synchronous rotation, and means for controlling rotation of said feed rolls.

17. In a typewriter having a frame, and a traveling paper carriage carrying a platen therein, the combination of a pair of front ribbon guides on said carriage and outside the sides thereof for directing a ribbon across said carriage in a path which includes the entire typing line and is directed downwardly at the ends thereof, means for directing a ribbon backwardly along the sides of said carriage below the center line of said platen, a pair of rear ribbon guides to receive ribbon from said means, a ribbon feed roll at each rear corner of the carriage, each said feed roll positioned to receive ribbon from the one of said

rear ribbon guides at the opposite end of said carriage, a pair of ribbon spools on said frame, and a pair of rolls on said frame, one for paying ribbon supplied by one of said spools off toward one of said carriage-carried feed rolls and the other of said rolls for receiving ribbon from the other of said carriage-carried feed rolls and paying it off to the other spool, said carriage-carried rolls and said ribbon spools being accommodated within the width limitations of said frame.

18. In a typewriter having a frame, types operable to a common printing point on said frame, and a traveling paper carriage, the combination of a ribbon, ribbon guide means on said carriage for guiding said ribbon across the front of said carriage in a path which includes the entire typing line, a guide member and a rotatable feed roll at each rear end of said carriage, said guide members being in different planes, and each said rotatable feed roll being in the same plane as the guide member on the opposite end of the carriage, a pair of rolls and a pair of ribbon spools on the rear of said frame, one of said latter rolls and one of said ribbon spools being in the plane of one of said carriage-carried feed rolls, and the other roll and other spool on the rear of the frame being in the plane of the other said carriage-carried feed roll, a belt connecting said carriage-carried feed rolls for synchronous rotation, a stationary clamp normally effective to hold one side of said belt, and means to release said clamp transitorily incidental to each operation of a type.

19. In a typewriter having a frame, types operable to a common printing point, and a traveling paper carriage, the combination of a ribbon, ribbon guide means on said carriage for guiding said ribbon across the front of said carriage in a path which includes the entire typing line, a guide member and a rotatable feed roll carried on each rear end of said carriage, each said rotatable feed roll being in a different plane and the guide member on the end of the carriage opposite to each feed roll being in the same plane therewith, a pair of ribbon spools on the rear of said frame, each one of said ribbon spools in the same plane with one of said carriage-carried feed rolls, means to hold at least one of said feed rolls against rotation, a belt connecting said carriage-carried feed rolls for synchronous rotation, a stationary clamp normally effective to hold one side of said belt, and means to release said clamp and said feed roll holding means transitorily incident to each operation of a type.

20. In a typewriter having a frame, types operable to a common printing point, and a traveling paper carriage, the combination of a ribbon, ribbon guide means on said carriage for guiding said ribbon across the front of said carriage in a path which includes the entire typing line, a guide member and a rotatable feed roll at each rear end of said carriage, said guide members being in different vertical planes, and each said rotatable feed roll being in the same vertical plane as the guide member on the opposite end of the carriage, a pair of rolls and a pair of ribbon spools on the rear of said frame, one of said latter rolls and ribbon spools vertically aligned with each of said carriage-carried feed rolls, a belt connecting said carriage-carried feed rolls for synchronous rotation, a stationary clamp normally effective to hold one side of said belt, means to release said clamp transitorily incidental to each operation of a type, means for displacing said first ribbon guide means and the included portion of said ribbon to an ineffective position, and means controlled by the displacing means to disable said clamp releasing means.

21. In a typewriter having a frame, types operable to a common printing point, and a traveling paper carriage, the combination of a ribbon, ribbon guide means on the carriage for guiding said ribbon in a path including the entire typing line, cooperating means on said carriage and said frame normally operated by said carriage during its movement to feed said ribbon through said carriage-carried guide means, the ribbon feed being, at said typing line, equal to the movement of said carriage but directionally opposite, electromagnetic means transitorily activated responsively to operations of said types to disable said cooperating means and thus prevent feed of said ribbon through said carriage during such carriage movements as are responsive to operations of said types, a roll on said frame over which the ribbon in frictional contact is supplied to the carriage, normally effective means for locking said roll, and means operated concomitantly with said electromagnetic disabling means for releasing said normally effective locking means.

22. In a typewriter having a frame, types operable to a common printing point, and a traveling paper carriage, the combination of a ribbon, ribbon guide means on the carriage for guiding said ribbon in a path including the entire typing line and about said carriage, means on said carriage and said frame normally cooperative during movement of the carriage to feed said ribbon through said carriage-carried guide means, the ribbon feed being, at said typing line, equal to the movement of said carriage but directionally opposite, means transitorily activated responsively to operations of said types to disable said cooperative means and thus prevent feed of said ribbon through the carriage during typing, a ribbon supply spool and a ribbon take-up spool mounted on said frame, rolls on said frame over which the ribbon passes, normally effective means for locking at least one of said rolls, and additional means activated transitorily responsively to the operation of said types for releasing said normally effective locking means, whereby ribbon is drawn off said supply spool only incidental to typing.

23. In a typewriter having a frame, a plurality of type actions and a traveling paper carriage, the combination of a ribbon, ribbon guide means on the carriage for guiding said ribbon in a path along the entire typing line and about said carriage, cooperating means on said carriage and said frame normally operative by said carriage during its movement to feed said ribbon through said carriage-carried guide means, the ribbon feed being, at said typing line, equal to and opposite in direction to the movement of said carriage, means under control of said type actions to disable one of said cooperating means and thus prevent feed of said ribbon during a carriage movement responsive to an operation of one of said type actions, a ribbon supply spool and a ribbon take-up spool mounted on said frame, ribbon guide rolls on said frame, normally effective means for locking one of said guide rolls, means operated by said type action controlled means for releasing said normally effective locking means whereby said ribbon may be withdrawn from said supply spool only during carriage movements under control of said type actions, means for displacing some of said ribbon guide means to a position wherein said rib-

bon is in an ineffective position, and means operated thereby for rendering ineffective said type action controlled means.

24. In a typewriter having a frame, a plurality of type actions, and a traveling paper carriage, the combination of a ribbon, ribbon guide means on said carriage for guiding said ribbon across the front of said carriage in a path which includes the entire typing line, a guide member and a rotatable feed roll at each rear end of said carriage, said guide members being in different planes at the rear of the machine, and each said rotatable feed roll being in the same plane as the guide member on the opposite end of the carriage, a pair of rolls and a pair of ribbon spools on the rear of said frame, one of said latter rolls and one ribbon spool in the plane with one of said feed rolls, the other of said latter rolls and the other ribbon spool in the plane of the other of said feed rolls, a belt connecting said feed rolls for synchronous rotation, a stationary clamp normally effective to hold one side of said belt, a normally ineffective auxiliary clamp on said carriage for said belt, operating means for said clamps, and type action controlled means for controlling said operating means.

25. In a machine of the class described having a frame, a plurality of type actions, and a traveling paper carriage, the combination of a front ribbon guide member, a rear ribbon guide member and a rear feed roll at each end of said carriage for directing a ribbon about said carriage in a path which includes the entire typing line and two stretches at the rear of said carriage, each of said stretches being substantially equal in length to said typing line and parallel to the direction of motion of said carriage, means connecting said feed rolls for synchronous rotation, normally effective means on said frame cooperative with said connecting means to cause such synchronous rotation upon movement of said carriage, means controlled by said type actions for rendering said normally effective means ineffective, means mounting said front ribbon guide members for vertical movement with respect to said carriage, and means operated by said mounting means when in one position to disable said type action controlled means.

26. In a machine of the class described having a frame, a plurality of type actions, and a traveling paper carriage, the combination of a front ribbon guide member, a rear ribbon guide member and a rear feed roll at each end of said carriage for directing a ribbon about said carriage in a path which includes the entire typing line and two stretches at the rear of said carriage, each of said stretches being substantially coextensive with said typing line and parallel to the direction of motion of said carriage, means connecting said feed rolls for synchronous rotation, normally effective means on said frame cooperative with said connecting means to cause such synchronous rotation upon movement of said carriage, normally ineffective means on said carriage to prevent rotation of said feed rolls, each said normally effective and said normally ineffective means comprising an electromagnet, a switch controlled by said type actions for energizing said electromagnets and thereby rendering said normally effective means ineffective and said normally ineffective means effective, a frame mounted guide roller and a ribbon spool in alignment with each of said carriage-carried feed rolls, means mounting said front ribbon guide members for vertical movement with respect to said carriage, and means operated by said mounting means when in one position to prevent energization of said electromagnets.

27. In a typewriter having a frame, a traveling paper carriage and a plurality of type actions, the combination of a ribbon supply spool and an aligned ribbon guide roll on said frame, a ribbon feed roll on one end of said carriage aligned therewith, a ribbon guide on the opposite end of said carriage aligned with said feed roll, other guide means on said carriage for directing a ribbon from said first ribbon guide to the front of said carriage and across the entire typing line thereof, and to the rear of the first end of the carriage, another ribbon guide at the rear of the end of the carriage where the ribbon is directed rearwardly, a feed roller at said opposite end of said carriage, another ribbon guide roll and a ribbon take-up spool on said frame, means normally effective during movement of said carriage and operating to prevent feed of a ribbon relative to the printing point of said type actions, and type action controlled means to disable said normally effective means whereby said carriage by its movement will advance a ribbon relative to said printing point.

28. In a typewriter or the like, having a frame, typing instrumentalities, and a work-sheet supporting carriage, the combination of a plurality of ribbon guides carried by said carriage for directing a ribbon about said carriage in a path which includes a ribbon stretch along the entire typing line, a device on said carriage mounting certain of said guides which give the ribbon said stretch along the typing line, means for lowering said device to place below the writing line said ribbon stretch, a ribbon feed roll at each rear corner of the carriage, one of said feed rolls positioned to receive ribbon from one of said guides which is at the opposite end of the carriage, and the other one of said feed rolls positioned to pay off ribbon to one of said guides which is at the end of the carriage which bears the other feed roll, means connecting said feed rolls for synchronous rotation, means on said frame normally in control of said connecting means to cause rotation of said feed rolls when the carriage is moved, and means controlled by each operation of the typing instrumentalities for rendering said last means transitorily ineffective.

29. In a typewriter or the like, having a frame, typing instrumentalities, and a work-sheet supporting carriage, the combination of a plurality of ribbon guides carried by said carriage for directing a ribbon about said carriage in a path which includes the entire typing line, a device on said carriage for mounting two forward ones of said guides, means for rocking said device downwardly to lower the ribbon along said writing line to an idle position, a ribbon feed roll at each rear corner of the carriage, means connecting said feed rolls for synchronous rotation, means on said frame normally in control of said connecting means to cause rotation of said feed rolls when the carriage is moved, means controlled by the typing instrumentalities at each operation thereof for rendering said causing means transitorily ineffective, and means controlled by said device for rendering said causing means disabled in the downwardly rocked position of the device.

30. In a typewriting machine or the like, a platen roll, shaft portions extending from opposite ends of the platen roll, a platen supporting frame having lateral ends provided with seats

for accommodating the extending platen shaft portions for ready removal of the platen roll upwardly, and means to support a transfer ribbon stretched along the front of and substantially contiguous to the platen roll, said ribbon supporting means comprising at each end of the platen frame an arm pivotally supported thereon at the rear of the platen roll for vertical swinging movement, said arms reaching forwardly from their pivotal supports under the platen shaft portions, means on said arms to support a stretch of ribbon in front of said platen shaft portions stretched in working location along the front of the platen roll, and means to lower said arms concomitantly to lower said stretch of ribbon below the writing line.

31. In a typewriting machine or the like, a platen having extending shaft ends, means to support the platen turnably by its shaft ends, guide means to support a transfer ribbon in a feeding course including a ribbon stretch along a typing line on the platen and including transversely of the platen beyond each end thereof a ribbon lap trained below said extending shaft ends, for the ribbon to be supplied from and payed off to the rear, said guide means including at each end of said ribbon stretch a ribbon guide member, means to mount said members for downward movement to position said ribbon stretch idly below the typing line, and means to direct writing material from the rear around the bottom of the platen and in an upward sweep to rise freely in front of said ribbon stretch while it is positioned at the typing line, said directing means for the writing material terminating at the front to leave space for the positioning of said ribbon stretch below the typing line, and the ribbon stretch when so placed providing for passage of writing material between it and the platen upwardly from said directing means.

32. In a typewriter having type actions for typing at a common point and a traveling paper carriage, in combination, means for guiding a ribbon in a path along the entire typing line, means, effective in response to travels of the carriage, to effect movement of the ribbon along the typing line with respect to the carriage in a direction opposite that of the instant carriage travel so as to maintain the ribbon substantially stationary relative to the typing point, and means effective in response to each type action operation to effect a transitory disablement of the movement-effecting means, said disablement-effecting means comprising, a universal bar which is operated and restored respectively by the operating and restoring strokes of the type actions, and a device controlled solely by the universal bar and operated thereby reversely respectively at the beginning of the universal bar operation and the end of the universal bar restoration, to effect said transitory disablement of the movement-effecting means.

33. In a typewriter having type actions for typing at a common point and a traveling paper carriage, in combination, means for guiding a ribbon in a path along the entire typing line, means, effective in response to travels of the carriage, to effect movement of the ribbon along the typing line with respect to the carriage in a direction opposite that of the instant carriage travel so as to maintain the ribbon substantially stationary relative to the typing point, and means comprising an electromagnetic operating device, effective in response to each type action operation to effect a transitory disablement of the movement-effecting means, said disablement-effecting means further comprising, a universal bar which is operated and restored respectively by the operating and restoring strokes of the type actions, and an electric switch device, controlled solely by the universal bar and operated thereby reversely respectively at the beginning of the universal bar operation and the end of the universal bar restoration, for controlling the transitory disablement of the movement-effecting means.

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