

Aug. 19, 1947.

J. TOGGENBURGER

2,425,967

RIBBON FEED FOR TYPEWRITING MACHINES

Original Filed Dec. 31, 1943 6 Sheets-Sheet 1

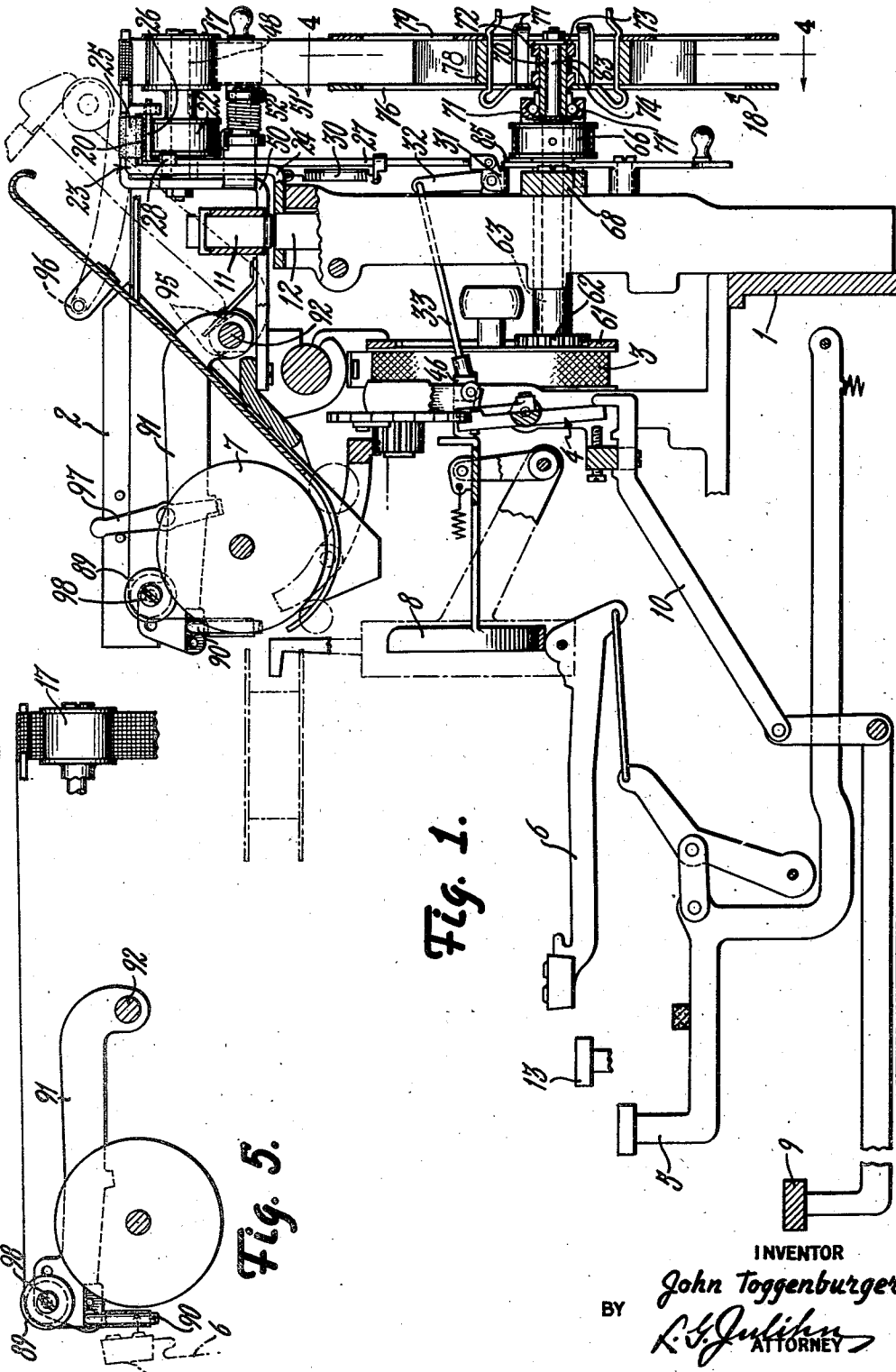


Fig. 1.

Fig. 5.

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RIBBON FEED FOR TYPEWRITING MACHINES

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6 Sheets-Sheet 2

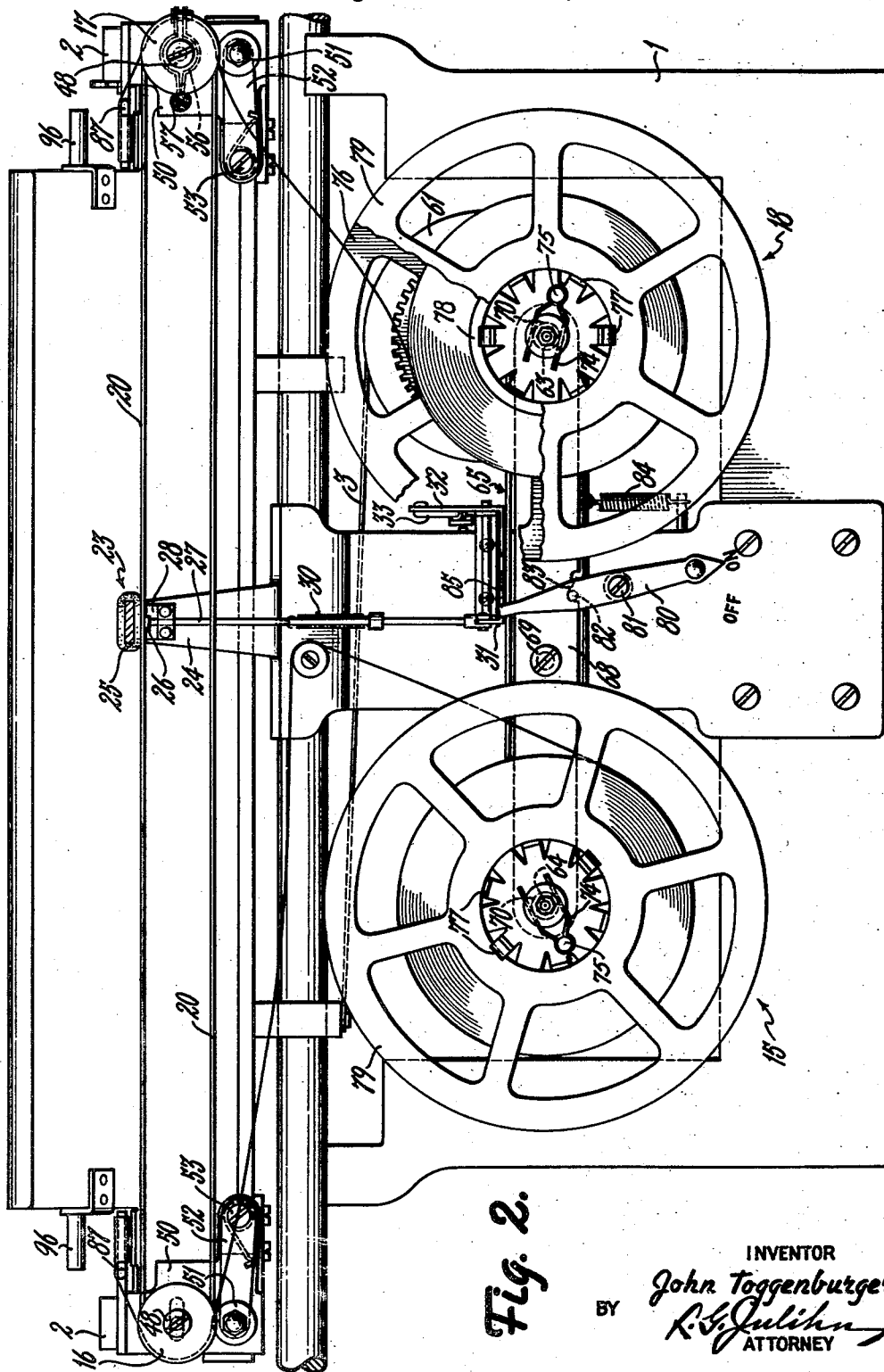


Fig. 2.

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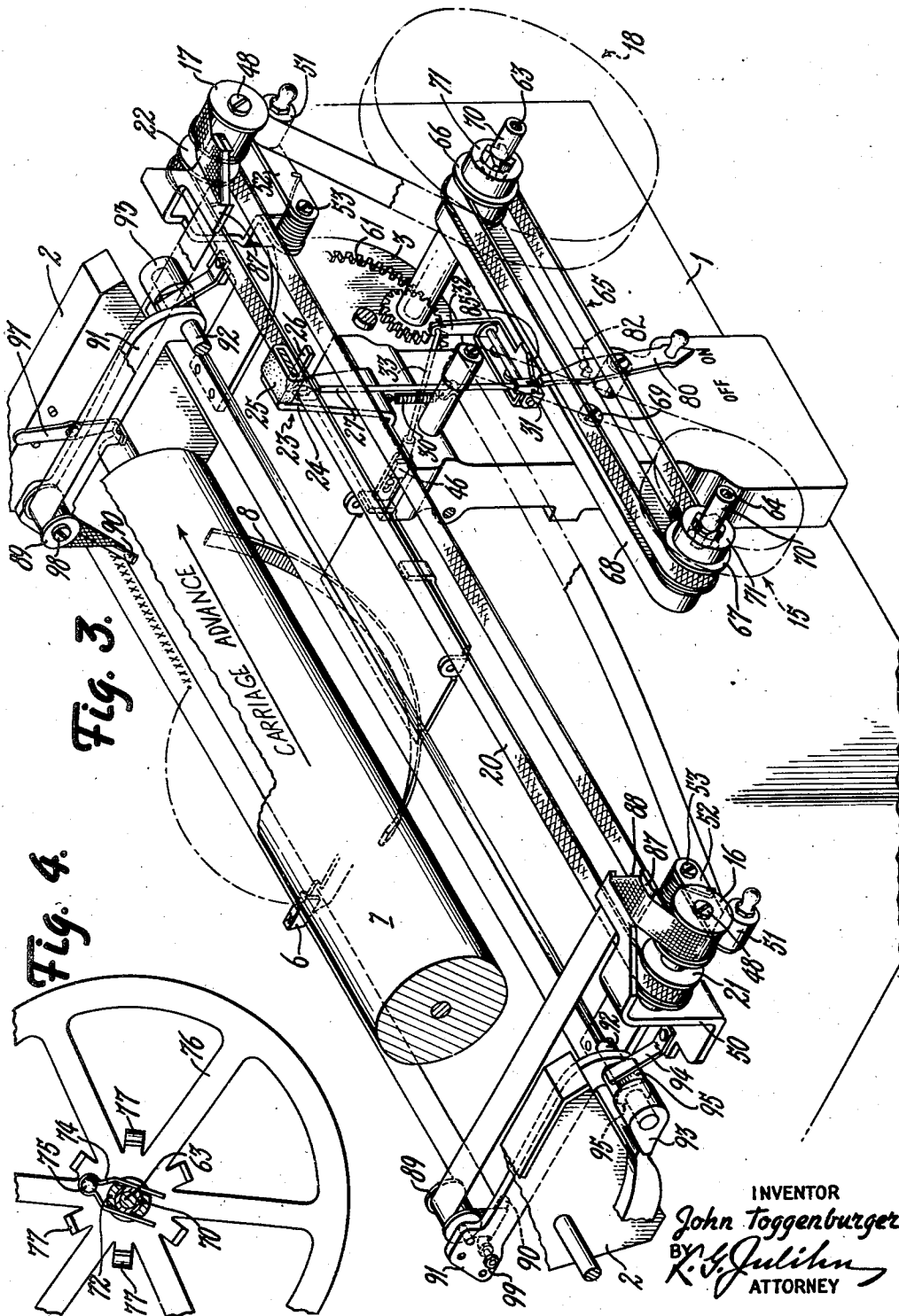
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RIBBON FEED FOR TYPEWRITING MACHINES

Original Filed Dec. 31, 1943

6 Sheets-Sheet 3



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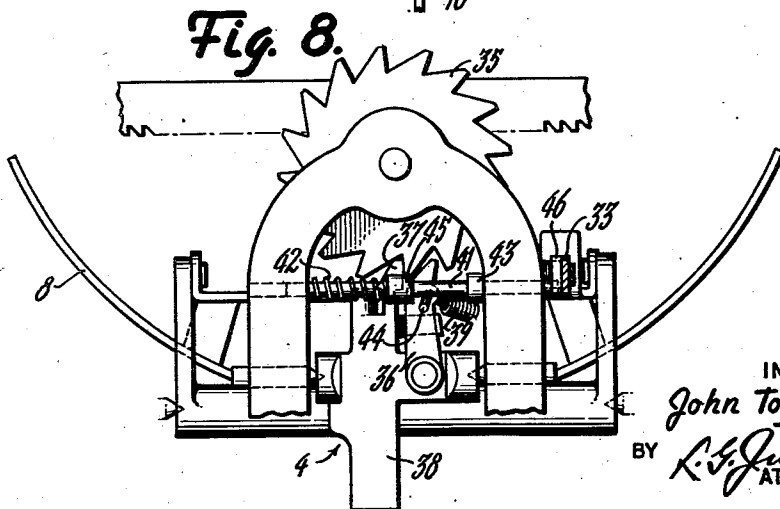
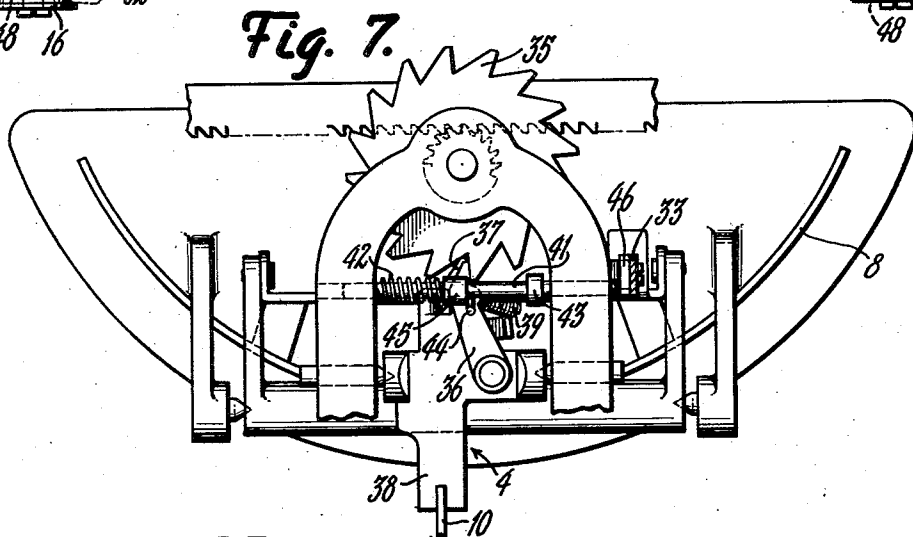
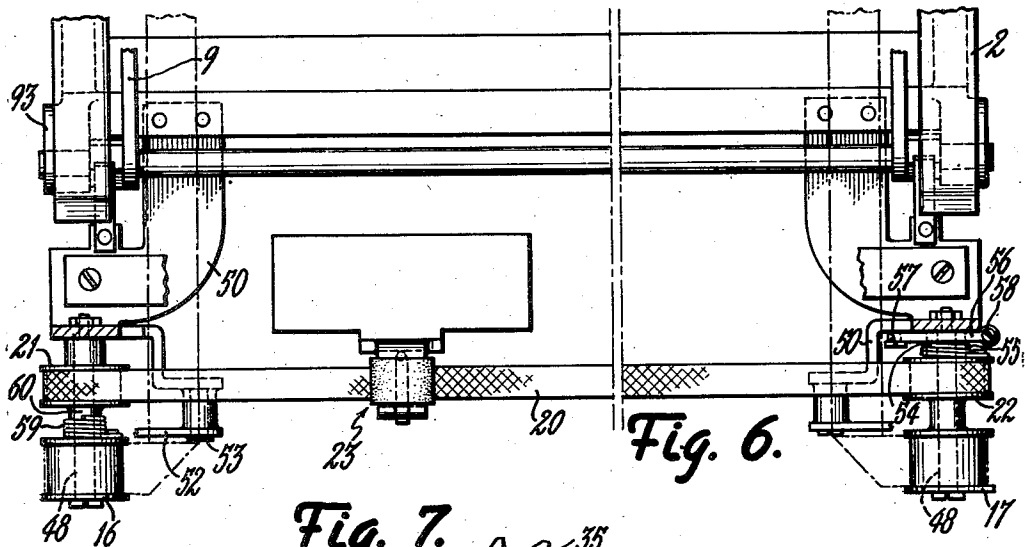
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RIBBON FEED FOR TYPEWRITING MACHINES

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6 Sheets-Sheet 4



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RIBBON FEED FOR TYPEWRITING MACHINES

Original Filed Dec. 31, 1943

6 Sheets-Sheet 5

Fig. 9.

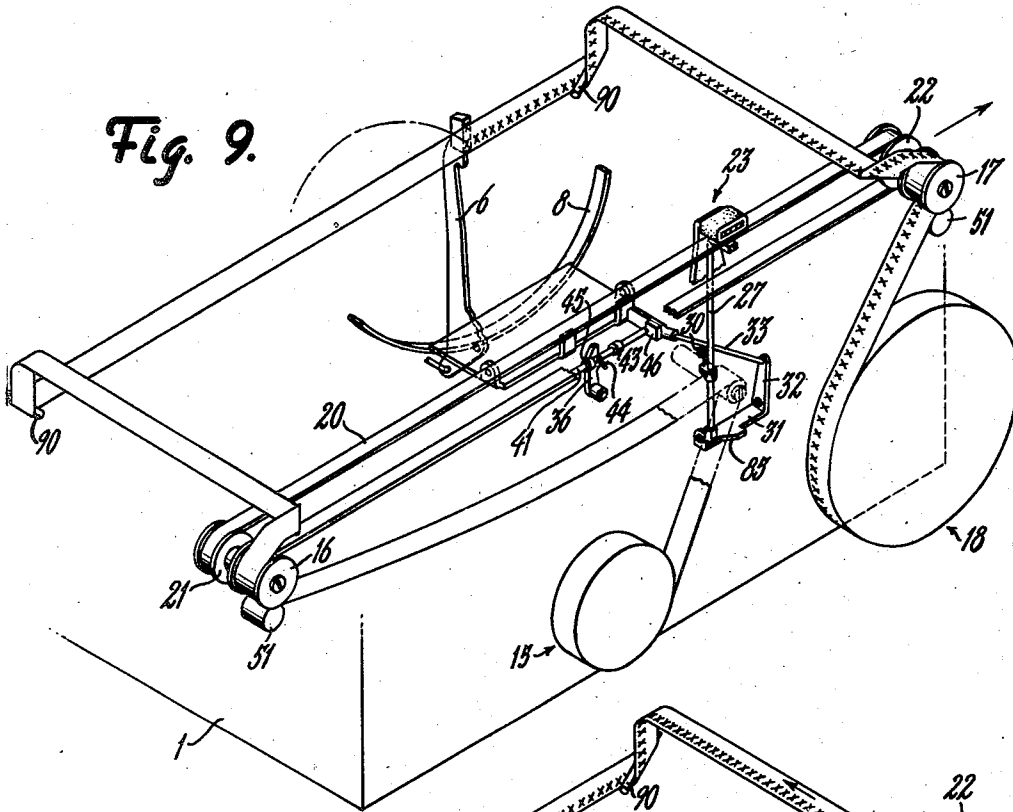
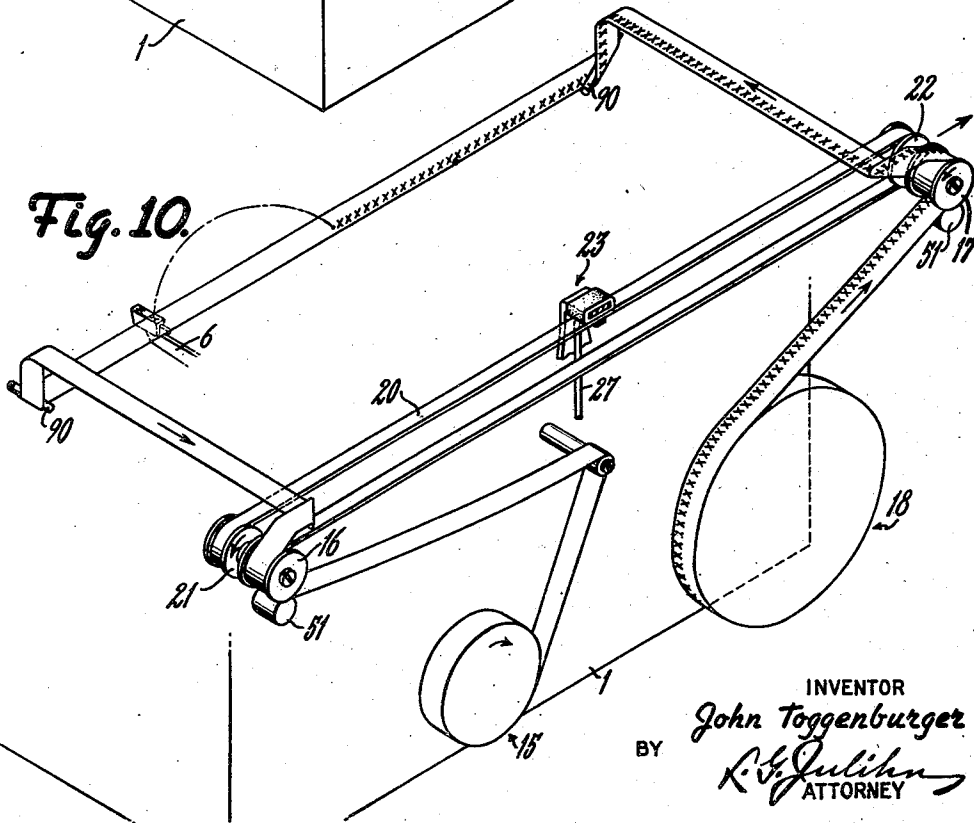


Fig. 10.



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RIBBON FEED FOR TYPEWRITING MACHINES

Original Filed Dec. 31, 1943

6 Sheets-Sheet 6

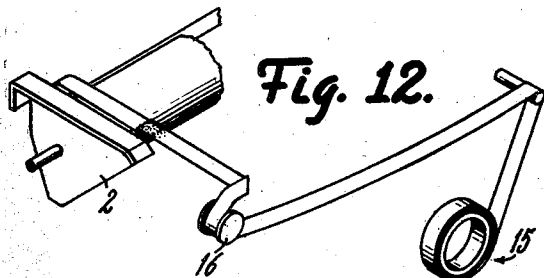


Fig. 12.

Fig. 14.

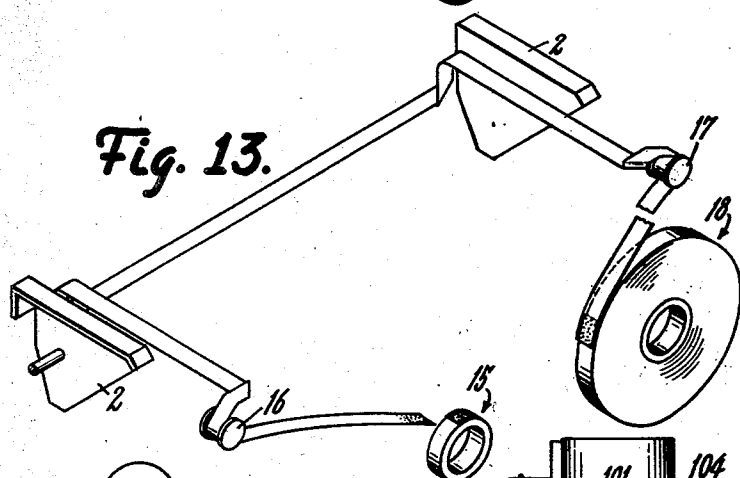


Fig. 13.

Fig. 11.

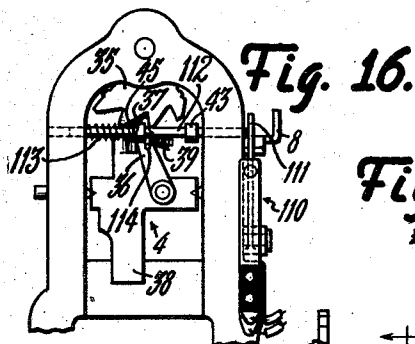
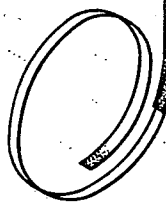
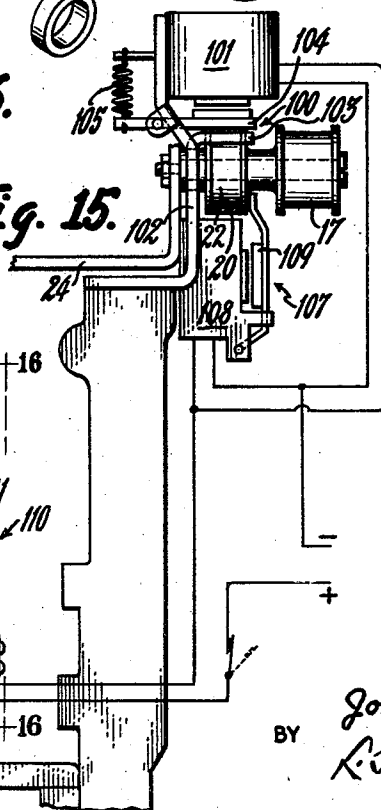


Fig. 16.

Fig. 15.



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UNITED STATES PATENT OFFICE

2,425,967

RIBBON FEED FOR TYPEWRITING
MACHINES

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Continuation of application Serial No. 516,516,
December 31, 1943. This application May 26,
1945, Serial No. 596,039

27 Claims. (Cl. 197—151)

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This application is a continuation of my earlier
filed application, Serial No. 516,516, filed Decem-
ber 31, 1943.

This invention relates generally to ribbon-feed
mechanisms, and more particularly to such
mechanisms for feeding hectograph carbon rib-
bon or other special ribbon on typewriters espe-
cially adapted for the typing of reduplicative
master sheets.

In duplicating work involving production of
numerous copies by the spirit duplicating or offset
processes, a typed record on the prepared master
sheet is transferred successively to a number of
copy sheets. The typing of the master sheet en-
tails the use of special hectograph ribbon which
assures a heavy and uniform deposit of transfer
ink to the master sheet at each type impression.
In that this heavy deposit of transfer ink is essen-
tial to satisfactory work, only one type impression
in a given area of the ribbon may be made.

Economic use of hectograph ribbon therefore
requires feed mechanism which will present each
and every type-unit area of the ribbon to the
type-impressing point of the typewriter, so that
when a spool of ribbon is used up a type im-
pression will have been made on practically every
type-unit area of the entire ribbon. This requires
feeding of the ribbon with such accuracy that
the ribbon advance closely matches the letter-
feed steps of the paper carriage. Further, the
ribbon is to be fed only during carriage travel
attending the type-impressing operations, thus to
eliminate the considerable waste of ribbon that
would result from ribbon feed during non-typing
carriage travel.

One of the objects of the present invention is
to provide improved ribbon-feed mechanism
which will effect feed of the ribbon only for the
type-impressing steps of the carriage and will as-
sure non-feeding during all travels of the car-
riage attending non-typing operations.

Another object resides in providing mechanism
operative to feed ribbon relative to the typing
point of the machine in increments of feed sub-
stantially equal to the steps of the carriage ad-
vance taken incident to each character-type im-
pression.

Another object is to accomplish control of the
ribbon feed by electromagnetic means in response
to type action operation, to cause feeding of the
ribbon incident to a letter-feed step of the car-
riage.

A further object resides in providing a ribbon
feed mechanism operative to assure advance of
the ribbon, incident to carriage letter-feed steps,

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to the full extent of such step and under control
of the letter-feed mechanism.

Another object is to provide a hectograph rib-
bon feed mechanism which is confined within the
compass of the conventional typewriter, elimi-
nating the need for heretofore necessary feed-
roll supporting brackets extending appreciably
beyond the body of the machine.

A further object is to provide devices for mov-
ably supporting and guiding the ribbon along
the typing line at the platen, which are adapted
to provide either of two arrangements necessary,
respectively, for the typing of the master sheets
for use in either direct transfer or offset re-
duplicating.

Another object is to have the typewriter readily
convertible for use in conventional typing using
the usual ribbon feed mechanism, by providing
for convenient disablement of the hectograph
ribbon feed and for positioning the hectograph
ribbon guiding device, normally supporting the
ribbon along the type line, in such location as to
afford efficient use of the machine as a conven-
tional typewriter.

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

In its more specific embodiment the invention
provides a ribbon-feed mechanism including feed
rolls and a carriage-actuated drive to the rolls,
operative so that the ribbon is maintained sta-
tionary at the typing point of the typewriter dur-
ing all non-typing carriage movements such as
tabulating, paragraph or other indenting and
particularly word-spacing, and causes ribbon-
feed relatively to the typing point only when the
carriage is stepped in consequence of a type ac-
tion stroke. The feed-roll driving means may
take the form of a belt drive and clutch device
arranged so as to be actuated in response to
travels of the carriage to thereby rotate the feed
rolls and thus move the ribbon over the carriage
in keeping with the travels of the carriage inci-
dent to non-typing operations. In effect, this
movement of the ribbon over the carriage nullifies
the movement of the ribbon by the carriage, the
ribbon being moved in opposite direction, and re-
sults in maintaining the ribbon stationary rela-
tive to the printing point. Means are provided
by which the clutch device is released to momen-
tarily disable the feed roll drive in response to
a type action operation. This results in causing
the ribbon on the carriage to move bodily there-
with and thereby effect a step of ribbon advance

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relative to the typing point, incident to a letter-feed step of the carriage.

In the drawings:

Figure 1 is a sectional view through the typewriter embodying the invention, taken on a fore-and-aft vertical plane about midway of the typewriter. The ribbon is arranged for making ink impressions on the back of the master sheet, for use in the direct transfer reduplicating process,

Figure 2 is an elevational view of the back of the typewriter,

Figure 3 is a perspective view of the typewriter as viewed from the back thereof, portions of the mechanism being omitted or broken away to facilitate illustration,

Figure 4 is a fragmentary section taken on line 4-4 of Figure 1, showing one of the ribbon spool mounts and the friction device associated therewith,

Figure 5 is a fragmentary sectional view similar to Figure 1 but showing the ribbon guiding devices arranged so that the ribbon is in front of the master sheet, for typing master sheets for use in the offset reduplicating process,

Figure 6 is a fragmentary plan view of the ribbon-feed mechanism,

Figures 7 and 8 are detailed elevational views of the letter-feed escapement mechanism, including devices operative in conjunction with the ribbon-feed mechanism, Figure 7 showing the quiescent condition of the mechanism and Figure 8 showing the condition immediately following the depression of a character key, that is, in the initial phase of effecting letter-feed advance of the carriage in actual typing,

Figure 9 is a diagrammatic view in perspective showing the ribbon-feed mechanism in the condition occurring during the operation thereof resulting from a typebar stroke, that is, during an actual typing operation causing letter-feed advance of the carriage,

Figure 10 is a view similar to Figure 9 but showing the condition of the ribbon-feed mechanism occurring during a non-typing advance movement of the carriage, such as occurs in tabulating or word-spacing,

Figure 11 illustrates in perspective a supply of hectograph ribbon as it may be furnished to the consumer, equipped with a leader strip and a trailer strip of non-inked ribbon,

Figure 12 is a fragmentary view in perspective showing the hectograph ribbon in the machine with the trailer strip thereof partly advanced through the feeding mechanism, just prior to installing a new ribbon,

Figure 13 is a view similar to Figure 12 showing the position of the ribbon assembly in the machine when the inked ribbon is exhausted, the trailer strip assuming the course through the ribbon-guiding devices preparatory to installing a replacement spool,

Figure 14 shows a portion of hectograph ribbon after being used in a typewriter embodying the invention,

Figure 15 is a fragmentary sectional view similar to Figure 1 but illustrating a second embodiment or modification of the invention, being a system of electrically operating and controlling the ribbon-feed mechanism, and

Figure 16 is a fragmentary elevation as viewed on line 16-16 of Figure 15.

Referring to Figure 1, the typewriter embodying the invention includes a usual main frame 1,

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supporting the various typing instrumentalities, and a platen-supporting carriage 2 arranged to travel on the main frame in line-typing and return directions. A spring-actuated drum 3 moves the carriage in line-typing direction under control of the usual letter-feed escapement mechanism 4, in which escapement dogs on a reciprocating carrier, hereinafter described, cause the carriage to be moved in letter-space steps, in the usual manner.

Upon depressing any one of a series of character type keys 5, a typebar 6 is actuated to strike a work sheet on the platen 7. In approaching the platen the typebar engages a universal bar 8 which operates the escapement to effect letter-feed. To cause the carriage to advance one letter space without typing for word-spacing, a space bar 9 is depressed which, through a link 10, operates the escapement to advance the carriage one letter space.

The usual tabulating mechanism, shown only in part, may include a series of tabulator stops 11 supported on the carriage 2, arranged at selective intervals for cooperation with a tabulator blade or blades 12. Upon depressing a tabulator key 13, the blade 12 is projected into the path of the set stops 11 and, simultaneously, the carriage is released from escapement control for actuation by the spring drum 3. The carriage thus makes a tabulating jump, terminated by the engagement of the blade 12 with the advancing stop, in the usual manner.

The above operations of the typewriter, except actual typing, including word spacing, tabulating, and additionally those of back spacing, paragraphing or other indenting, and carriage return are all operations that involve movement of the carriage in either line typing or return directions. However, although the drive of the ribbon-feed mechanism of the invention is actuated by the carriage, said mechanism operates in such manner that actual ribbon-feed relative to the typing point of the typewriter is effected only when actual typing is being done, that is, only when a type-impression is made on the work sheet.

General description of ribbon feed mechanism

As shown best in Figure 3, the hectograph ribbon is supplied from a suitable source, such as a spool 15, from which it passes around a feed roll 16 preferably on the carriage, is thence routed by suitable guiding devices forwardly over one end of the carriage, and thence across the front of the platen along the typing line. From the span in front of the platen other guiding devices route the ribbon over the other end of the carriage where it passes around a second feed roll 17 to a receiver or spool 18.

The ribbon-feed mechanism comprises means for driving preferably the two feed rolls 16 and 17 in harmony with the travel of the carriage and, in the embodiments shown, takes the form of an endless belt 20 taut between two pulleys 21 and 22 preferably on the carriage, each pulley being operatively connected with a corresponding one of the feed rolls. The driving means further includes a clutch device, herein shown as a clamp 23, mounted on the main frame 1 of the typewriter and adapted to clutch the carriage-carried belt to the main frame during all operations except the actual type-impressing operations, and to unclutch the belt during only the type-impressing operations. That is, the clamp 23 grips the belt at all times except when the carriage is

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being advanced in a letter-feed step incident to a type-impressing operation, as will be presently manifest.

In considering the action of the ribbon-feed mechanism it should be noted that the term "ribbon-feeding" as herein applied, signifies movement of the ribbon relative to the typing point on the main frame, in distinction from mere movement of the ribbon through the guiding devices on the carriage. That portion of the ribbon actually of concern in understanding the operation of ribbon-feed is the run of ribbon on the carriage extending from one feed roll to the other, particularly the span of ribbon along the typing line at the front of the platen. The significance of the term "ribbon feeding" will be clear when it is noted that because the ribbon is principally carried by the carriage, actual ribbon feeding takes place while the ribbon is in fact stationary on the carriage, and that feeding of the ribbon relative to the typing point results merely from the advance movement of the carriage which transports the ribbon across the typing point. When no actual ribbon feeding takes place, the ribbon is nevertheless being moved on the carriage. This ribbon movement compensates for the travel of the carriage, with the result that no movement of the ribbon relative to the typing point occurs and the ribbon is said to be not feeding.

The operation of the ribbon-feed mechanism during a non-typing advance of the carriage is shown in Figure 10. As before indicated, the clamp 23 is closed when the typewriter is not operated and this belt-clutching condition maintains during carriage advance incident to the non-typing operations. Assume now that the tabulator key 13 is being operated to advance the carriage to a new column defining position. Upon operation of this key, the carriage is released from letter-feed control and advances in letter-feed direction the prescribed distance. Since belt 20 remains clamped to the main frame, during this advance, the ensuing travel of the pulleys 21 and 22 with the carriage causes these pulleys to be rotated by the belt, to thereby turn the feed rolls 16, 17 each a peripheral extent equivalent to the amount of carriage advance made in the tabulating run. This causes the ribbon to be moved over the carriage, with the result that the span of ribbon at the front of the platen is moved leftwardly, as viewed in Figure 10, an extent corresponding to that of the rightward carriage advance. Thus, as the carriage is moving rightwardly, the front ribbon span is being moved leftwardly, both through the same distance but in opposite directions. The ribbon movement thus compensates for and negatives the carriage movement, the net result being that the same spot of the ribbon remains at the typing point and no ribbon-feeding occurs.

This same non-feeding operation takes place in the other non-typing functions of the typewriter which cause advance movement of the carriage, such as in word spacing or in manually advancing the carriage.

When the carriage is moved in the direction opposite that of letter-feed advance, such as in returning the carriage to begin a new line of typing, or in back spacing, the ribbon-feed mechanism operates in substantially the same manner as during non-typing carriage advance shown in Figure 10, except that the directions in which the carriage and ribbon are moved are reversed. Under these conditions the carriage is being

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moved leftwardly, as viewed in Figure 10 and, in that the clamp 23 is on, the feed rolls 16 and 17 are rotated clockwise as they move along with the carriage, thus causing the ribbon span in front of the platen to be moved rightwardly. In that the ribbon movement rightward is to the same extent as the carriage movement leftward, the same spot of ribbon remains at the printing point and, therefore, no ribbon feeding takes place.

The operation of ribbon feeding incident to an actual typing operation and the resultant carriage letter feed advance is shown in Figure 9. In the quiescent condition of the typewriter the clamp 23 is closed and is thus holding the belt at the clamping point in fixed relation to the main frame. Suitable means is provided by which the clamp 23 is released incident to the operation of any of the type actions, so that the ribbon moves bodily with the carriage and therefore feeding of the ribbon relative to the printing point results. In the embodiments illustrated, the clamp-releasing means includes the universal bar 8 which operates the letter-feed escapement incident to a type action operation. By mechanism hereinafter described, the universal bar 8 effects release of the clamp 23, so that during the interval in which the carriage takes a letter-feed step, as instituted by operation of the escapement, the belt 20 is released or unclutched from the main frame. This release allows the belt to remain stationary on the carriage while travelling bodily with it in the letter-feed step. Therefore, the feed rolls 16 and 17 are not rotated and no ribbon movement on the carriage takes place. Since the ribbon, also stationary on the carriage, is moving bodily with it, the front span of ribbon is being fed relatively to the typing point, with the result that a new spot of ribbon is presented at the typing point for each type bar stroke. In this way, although no actual ribbon movement on the carriage takes place, ribbon feeding is effected as a result of the letter-feed advance of the carriage.

It will now be seen that throughout all non-typing operations causing carriage advance, the ribbon is maintained in the same position relative to the typing point, and thus no ribbon-feed takes place. However, during the letter-feed advance occurring incident to an actual type-impressing operation, momentary release of clamp 23 causes ribbon feedings, but only to the extent to which the carriage advances. Thus, each successive typebar stroke will take an ink impression from the ribbon in the immediately succeeding, unused spot on the ribbon, notwithstanding the interspersing of word spaces or other blanks occurring in the typed line.

Clamp and clamp release mechanism

The belt clamp or clutch device 23, shown best in Figures 1, 2, and 3, comprises a bracket 24 secured to the main frame 1 and offset rearwardly to provide a shoe 25 overlying the upper strand of the belt 20. The shoe 25 may be provided with a facing of resilient, frictional material against which the upper face of the belt may bear. The free end of shoe 25 is bent downwardly and slotted to provide a guide. The clamp 23 further includes a movable shoe 26 arranged to reciprocate up and down on the bracket 24, having its rear portion slidable in the slot of shoe 25. A push rod 27 is secured to the shoe 26 and slides in a bearing 28 on the bracket. A spring 30 anchored on the bracket pulls rod 27 upwardly and

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thus urges shoe 26 toward shoe 25, to clamp the belt. The lower end of rod 27 is flexibly connected to a bail 31 rockable on the main frame.

The mechanism for releasing the clamp 23 includes the bail 31 of which an arm 32 has a plunger 33 connected thereto. At its forward portion, the plunger 33 is guided for sliding fore-and-aft of the typewriter and has its forward end arranged for engagement by the universal bar 8. By this mechanism the clamp 23 is released to free the belt, against the tension of spring 30, whenever a type bar approaches the platen in a type-impressing stroke.

Mechanism is provided by which the clamp 23 after being released by the universal bar 8, is maintained in released condition until the completion of a letter-feed step. By this mechanism, shown best in Figures 7 and 8, the clamp-releasing plunger 33 is held in moved position until the letter-feed escapement mechanism completes its operation of letter-feeding the carriage, that is, until the movable dog of the escapement resumes its quiescent position.

The letter-feed escapement may be of any well-known kind, in which the rotation of an escapement wheel such as wheel 35 is controlled by a holding dog 36 and a check dog 37 each mounted on a reciprocating dog carrier 38. In conventional escapements either the holding dog or the check dog may be movable. In the embodiments shown, the holding dog 36 is the movable dog, and is pivoted on the dog carrier 38 to limitedly swing in the plane of wheel 35 and is urged by a spring 39 to swing rightwardly as viewed in these figures. When the escapement mechanism is operated to effect a letter-step advance of the carriage, to provide either a letter space or a word space, the dog carrier 38 is oscillated forth and back to allow the escapement wheel 35 to escape one tooth. When not operated, the escapement mechanism is in the condition shown in Figure 7, in which the holding dog 36 is in control of the escapement wheel 35, being swung to its leftward limit by the tension on the carriage, and the check dog 37 is off to one side out of the plane of wheel 35. When the first phase of escapement operation takes place, that is, on depressing any character key 5 or the space bar 9, the mechanism assumes the condition shown in Figure 8, in which the holding dog 36 has been moved out of the plane of wheel 35 and is swung to its rightward limit by spring 39, while the check dog 37, moving into the plane of the wheel, assumes control of the escapement. When the dog rocker 38 returns to its normal position, incident to the release of the actuated character key or the space bar, the parts resume the Figure 7 position in which the holding dog 36 is again in control of the escapement wheel. It is to be noted that during these two phases of escapement operation, the movable dog 36 has been reciprocated, first to the Figure 8 position, and then back to the Figure 7 position. This action of the movable dog 36 is employed in maintaining clamp 23 fully released until the carriage completes its letter-feed step.

The mechanism for accomplishing this comprises a latch rod 41 arranged to slidably reciprocate in a plane parallel with the escapement wheel 35 and having a spring 42 urging the latch rod rightward to a position defined by a collar 43. The latch rod 41 is actuated leftwardly by the dog 36, said dog having a pin 44 engageable with a collar 45 on said rod. As shown best in Figure 9, the plunger 33 has an offset portion or shoulder

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46 adapted for engagement by the latch rod 41. When the escapement mechanism is quiescent, Figure 7, the dog 36 holds the latch rod retracted, with its latching end clear of plunger 33. Upon operating the escapement in its first phase during which dog 36 swings rightwardly, the latch rod 41 is released and slides rightwardly under influence of its spring 42. It will be observed that, concomitantly with the actuation of the escapement mechanism in its initial phase, the plunger 33 also has been moved rearwardly and, therefore, its shoulder 46 is just behind the latch rod which consequently engages said shoulder. Thus, the clamp 23 is latched in its released condition and so remains until the second phase of escapement operation is completed. In consequence of this second phase of operation the dog 36 is swung to its Figure 7 position and the latch rod 41 is accordingly retracted, thus freeing the plunger 33 and permitting the clamp 23 to again close and clutch the belt, under influence of spring 30.

It may be noted that if the dog 36 swings rightwardly before the plunger 33 is fully actuated, the latching end of rod 41 presses against the adjacent face of the plunger until its complete actuation allows the latch rod to engage behind shoulder 46.

Details of feed roll mechanism

As best shown in Figures 1, 2, and 3, each feed roll 16, 17 and the corresponding pulley 21, 22 are mounted for rotation on a stud 48 supported on the carriage by a bracket 50. An idler roll 51 is arranged to cooperate with each feed roll so as to maintain an ample contact of the ribbon with the periphery of the feed roll. Each idler roll is urged toward its feed roll by a spring-pressed arm 42 pivotally mounted on a pin 53 secured to the bracket 50.

As heretofore described, when no ribbon feeding is desired, that is, during all carriage movements except those incident to actual typing, the ribbon is being moved over the carriage at the same rate that the carriage is moved, and is reversed in direction each time the carriage starts in an opposite travel. To assure accurate ribbon movement in keeping with these travels of the carriage, and to maintain proper ribbon tension when the ribbon is held stationary on the carriage during the letter-feed steps effecting ribbon feed, certain devices now to be described are provided for cooperation with the respective feed rolls.

The rightward feed roll 17 and its pulley 22 are secured for rotation in unison, preferably by a connecting sleeve.

As shown in Figure 6, a brake collar 54 rotatable on the stud 48 is disposed between the pulley 22 and the bracket 50. The brake collar 54 is operatively connected to the pulley 22 by a one-way clutch 55, shown in the form of a helical spring embracing, and lightly tensioned to contract on, the collar 54 and having one end thereof secured to the pulley. The winding of spring 55 is such that when the pulley 22 or its feed roll 17 is rotated clockwise, the helical winding is tightened and thus grips the brake collar 54. Also cooperating with the collar 54 is a friction brake 56, preferably in the form of a spring comprising two looped members embracing and pressing on collar 54. The looped members are anchored at corresponding ends to the bracket 50 by a pin 57 and are drawn toward each other at their free ends by a screw 58, adjustment of

which affords means to vary the braking effect on the collar 54.

The action of the one-way spring clutch 55 and the friction brake 56 is as follows: During ribbon feeding in actual typing, Figure 9, the ribbon is stationary on the carriage and the feed roll 17, now non-rotative but travelling with the carriage, is pulling the ribbon from the take-up spool 18. Since the clamp 23 is released and the belt 20 is, therefore, not rotatively controlling the feed roll, this pull may tend to turn the feed roll clockwise. This tendency to turn causes spring clutch 55 to wind up and grip the collar 54 and thus causes the brake 56 to become effective to resist clockwise rotation of the feed roll. This braking effect is sufficient to unreel the ribbon from the take-up spool 18, without exerting any appreciable tension on the ribbon portion carried by the carriage.

The brake 56 is, however, ineffective when the carriage is advanced in tabulating or word-spacing, Figure 10, in that during these operations the clamp is on and the belt 20 is driving feed roll 17 counterclockwise. This has the effect of unwinding spring clutch 55 and therefore the feed roll 17 may rotate unimpeded by the brake 56.

When the carriage is returned to start a new line, its travel is usually in a continuous run approximating in extent the length of the typing line. During this run the ribbon is being moved over the carriage to the same extent. Since carriage return movement is leftward, as viewed in Figure 10, movement of the ribbon on the carriage is rightward or toward feed roll 17. Therefore, to avoid introducing a slack in the run of ribbon on the carriage, it is desirable to only pull the ribbon by the feed roll 17, and to avoid pushing the ribbon by feed roll 16. That is, it is preferable, in moving the ribbon during carriage return, to have only the feed roll 17 do the moving and to have feed roll 16 tend to lag behind and act merely as an idler roll. This is accomplished by interposing a one-way clutch 59 between feed roll 16 and its driving pulley 21, see Figure 6. This pulley 21 has a hub 60 which is not directly connected to feed roll 16. Instead, the spring clutch 59 forms the operative connection, and comprises a helical coil embracing the hub 60 and having one end attached to the feed roll. The direction of the coil winding is such that when drive pulley 21 is turned clockwise (the direction in which it is rotated by the belt incident to carriage return) the corresponding rotation of hub 60 has the effect of unwinding the coil and thus releases the feed roll 16 to the driving influence of the moving ribbon. Thus, the moving of the ribbon during carriage return is done by the other feed roll 17, which pulls the ribbon. Feed roll 16 merely rotates idly, guiding the ribbon to the carriage.

It may be noted, however, that the slight drag imparted by the clutch spring on hub 60 has the effect of urging feed roll 16 to rotate in harmony with feed roll 17, so that feed roll 16, in effect, is frictionally driven in keeping with the rotation of feed roll 17. But this light frictional drive will readily yield to the drive of the ribbon by feed roll 16, to avoid a tendency of over-driving feed roll 17 that would tend to push the ribbon and thus possibly cause a slack.

When the carriage is advancing in a tabulating jump or in word-spacing, moving rightwardly as shown in Figure 10, the ribbon is consequently being moved from right to left on the carriage and the belt 20 is therefore rotating pulley 21

counterclockwise. This causes clutch spring 59 to wind up and grip the pulley hub 60, so that the feed roll 16 is then positively driven by the belt. The ribbon is thus pulled through the carriage by feed roll 16 while feed roll 17 assists by moving the ribbon from spool 18, to the carriage. Since tabulating jumps, as well as word spacing, are relatively short compared to a return run of the carriage, there is practically no tendency of producing a slack in the ribbon on the carriage due to a pushing of the ribbon by driving the feed roll 17.

Ribbon spool mounting and drive

In order to minimize the pull of the ribbon on the carriage in unreeling from the spools, and to keep the slack between the feed rolls 16, 17 and the respective spools 15, 18 at a practical minimum, these spools are each frictionally driven in harmony with the travel of the carriage when, under the then occurring operating conditions, the ribbon is being paid from the carriage to the particular spool. When unreeling is in order, the particular spool is released from the spool drive by operation of a one-way clutch between the spool and its drive.

As shown in Figures 1 and 3, the carriage-actuating-spring drum 3 has an internally toothed ring gear 61 in mesh with which is a pinion 62 on a shaft 63. This shaft extends rearwardly from the gearing 61, 62 and carries the take-up spool 18. A shaft 64 carries the supply spool 15 and these two shafts are operatively connected by a belt drive 65 including pulleys 66 and 67, one secured on each of said shafts. The shafts 63, 64 are rotatably journaled at the respective ends of a supporting bar 68 which, for purposes hereinafter described, is pivotally mounted intermediate its ends by a stud 69 on the main frame of the machine.

As shown in Figures 1 and 4, each shaft 63, 64 rotatably carries a sleeve 70 forming part of the one-way clutch between each shaft of the corresponding spool. The ribbon spool 15, 18 is carried by this sleeve, being frictionally connected rotatively thereto by means presently described. The one-way clutch shown is of the roller-and-wedge type and includes a collar 71 secured to the pulley 66, 67 and having an internal groove providing a raceway for the clutch rolls. The sleeve 70 carries an annular series of wedges coactive with the clutch rolls to cause the sleeve to be clutched to or unclutched from its pulley 66, 67 depending upon the direction of rotation of the associated spool relative to its sleeve. As shown in Figure 3, the wedges on the sleeves 70 of the respective shafts 63, 64 are oppositely inclined. The clutch of shaft 63 grips when its pulley 66 is rotated counterclockwise, whereas the clutch of shaft 64 grips when its pulley 67 is rotated clockwise.

When the carriage is being returned or back-spaced, the pulley 66 at spool 18 is being driven counterclockwise by the carriage and thus causes the associated clutch to engage and thereby drive the spool so as to wind up the ribbon. However, when the carriage is advanced, the pulley 66 is driven clockwise and causes the clutch to release, allowing the spool 18 to unreel the ribbon, as such unreeling is required.

The one-way clutch associated with the other pulley 67 at spool 15 operates in like manner but in reverse relation to the direction of carriage travel. When the carriage is being advanced, pulley 67 is rotated clockwise and the clutch thus

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becomes engaged and drives spool 15 clockwise to wind up the ribbon. However, when the carriage is returned, this clutch becomes released and thus allows the ribbon to be unreel from spool 15, as required.

In determining the speed at which the gearing 61, 62 rotates the spools, several factors should be taken into account in order that the spools are driven fast enough to receive the ribbon being paid off to them. One of these factors is that, during carriage movement when no ribbon feed occurs, a length of ribbon approximating twice the length of the then occurring carriage travel is released to the then receiving spool. One half of that ribbon length is due to the moving of the ribbon over the carriage, which ribbon is paid off the carriage by the pulling feed roll, and the other half results from the movement of the pulling feed roll bodily toward that spool. This double pay-off of the ribbon therefore requires rotating the spools at such rate that the periphery of the roll of ribbon will advance about twice as fast as the carriage moves. The other factor to be considered is the widely varying diameter of the ribbon roll. In this regard a rate of rotation based on the minimum diameter of the ribbon roll will satisfy the conditions of greater diameter as well, provided suitable means is afforded by which to compensate for the overdrive of the ribbon rolls under the condition of increased diameter.

This compensating means is had by providing a friction connection between each drive sleeve 70 and the corresponding ribbon spool 15, 18. The spools 15 and 18 each have a hub 72, see Figures 1, 2, and 4, forming an integral part of the spool and fitting rotatably on the sleeve 70, being retained thereon by a washer 73. This hub provides two diametrically opposed, transverse slots, the bottoms of which are just below, and substantially tangential to, the bore of the hub. A spring clip 74 having two parallel tines is disposed in the hub slots and has a looped portion embracing a pin 75 on the spool. The inherent tension of clip 74 urges the tines toward each other so as to press on the sleeve 70 and thus effect a friction or drag to the rotation of the spool on the sleeve. The drag effected by this frictional connection is sufficient to drive the spool to wind up the ribbon, when sleeve 70 is rotated by its one-way clutch. But when the ribbon is made available to the spool at a slower rate than the spool is tending to wind the ribbon, the friction connection will slip and thus permit the spool drive to overrun the spool. Also, when movement of the corresponding feed roll with the carriage is for the moment away from the spool and requires unreeling, the friction connection permits slippage to occur and allow the unreeling. In either instance the span of ribbon from the feed roll to the spool will be maintained without excessive slack.

The ribbon spools 15 and 18 are constructed to afford convenient placement of a roll of ribbon thereon. Each spool comprises a fixed disk 76 to which the spool hub 72 is secured. Integral with the disk 76 is a series of prongs 77 arranged in a circle to receive the core 78 of the ribbon roll, some of these prongs being shaped to serve as spring clips for retaining a removable disk 79 of the spool.

Disabling ribbon feed mechanism

In order to have the typewriter readily convertible for conventional use, employing the usual

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inking ribbon and the conventional feed mechanism instead of the hectograph ribbon and the feed mechanism of the invention, provision is made to conveniently disconnect the ribbon spool drive and disable the feed roll drive by operating a single control element 80. As shown in Figures 1 and 2, this control element embodies a lever pivoted at 81 on the main frame and having a pin 82 cooperative with a cam 83 on the supporting bar 68 which carries the spool shafts 63 and 64. Swinging of the control lever from "on" to "off" position causes the pin-and-cam 82, 83 to swing bar 68 to a position in which the pinion 62 is out of mesh with the ring gear 61, thus disconnecting the ribbon spool drive. A spring 84 urges bar 68 to a position in which the pinion 62 is in mesh with the ring gear.

The control lever 80, in being swung to "off" position, also disables the ribbon feed mechanism by opening the ribbon-feed belt clamp 23. The upper end of lever 80 acts on a cam 85 forming part of the clamp-actuating bail 31, in such manner that the movable shoe 26 of the belt clamp is moved to, and held at, release position. Thus, with the control lever 80 in "off" position, the carriage may be moved back and forth during the operation of the machine in conventional typing, without causing any rotation of the feed rolls 16 and 17 and without effecting any drive of the ribbon spools 15 and 18. Of course, when the carriage is first moved during conventional typing, a slack of ribbon from off the spools is formed between each feed roll 16, 17 and the adjacent spool sufficient to accommodate subsequent travels of the carriage.

Features of ribbon guiding devices

In its route over the carriage from one feed roll 16, 17 to the other, the ribbon is guided by several guiding devices shown best in Figure 3. The devices at each end of the carriage are substantially similar, except that they are of opposite hand; therefore, a description of those at one end will suffice. The bracket 50 which supports feed roll 16, includes a substantially horizontal guide member 87 presenting two edges lying respectively crosswise and lengthwise of the carriage. Within the angle defined by these edges, the member 87 presents a diagonal edge 88 having projections at its ends. From the feed roll the ribbon passes over the member 87, around the diagonal edge 88 and thence under member 87, having been thus turned to a direction fore-and-aft of the carriage.

At the front of the carriage, the ribbon passes over a roller 89 which directs it downwardly, and thence the ribbon turns to a direction along the platen 7 by travelling over a diagonal guide rod 90. The roller 89 and guide rod 90 are supported on the carriage by an arm 91 which is secured to a torsion rod 92 extending from end to end of the carriage and journaled at each end in bearing brackets 93 mounted on the carriage. The rod 92 rigidly connects the arms 91, maintaining them in alignment in all positions. A leaf spring 94 presses on the hub of each arm 91, which hub has two flat faces 95, see Figure 1, coactive with the spring to yieldably hold the arms in either a normal, forward position, or an inactive position shown in dot-and-dash outline in Figure 1. In inactive position, the arms support the span of ribbon that is normally at the front of the platen, in a position in back of the paper rest of the carriage, entirely away from the platen, so that the machine may be used in conventional typing

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with the usual inking ribbon. A stud 96 is provided at each end of the paper rest, on which the spans of slack ribbon hang when the arms 91 are swung back.

In their normal, forward position, the arms 91 may hold the front span of ribbon at either of two elevations so as to present both of the longitudinal bands of the ribbon selectively to the printing point. The ribbon shown in the present embodiments has a width ample to afford two type impressions, one on the upper and the other on the lower band, see Figure 14. The ribbon is fed past the printing point until one band is fully used, after which the ribbon is again started through the machine to use up the other band. To present the unused band to the printing point, the arms 91 are elevated or lowered, depending on which band has been used first. To control the elevation of the arms 91 a gaging lever 97, see Figure 1, is pivotally mounted on the carriage adjacent one of the arms 91 and is limited to shift to either of two positions. This gaging lever provides an offset portion on which the adjacent arm 91 rests, and when said lever is swung to the alternate position the offset engages another part of the arm and keeps it at the other elevation.

Provision is made to have the span of ribbon at the front of the platen disposed either at the back of the work sheet, for typing direct process stencils, Figure 1, or at the front of the work sheet, for typing offset process stencils, Figure 5. The change from one to the other kind of work is made by relocating the roller 89 and the guide rod 90 in the alternate position on arm 91, Figure 1 or 5, and by reversing the ribbon, as by rethreading same, to have its ink surface facing appropriately, either forward or backward. The roller 89 is rotatable on a threaded stud 93 which is screwed into whichever of two tapped holes in arm 91 that appropriately locates the roller for the work at hand. The guide rod 90 is held in place by a clamp nut 99 on its threaded shank which extends through a hole in arm 91, two such holes being provided to suitably locate the guide rod for the work at hand.

For typing direct process stencils, type impressions for which are made on the back of the work sheet, the ribbon passes in back of the sheet and has its inked face forward. For this kind of work the roller 89 and guide rod 90 are arranged as shown in Figure 1. Note therein that the front of roller 89 is vertically aligned with the back of guide rod 90. Thus, the ribbon coming off roller 89 may pass in back of, and then around guide rod 90, coming off the front of said guide rod to run across the platen front. At the rear guiding devices 87 the ribbon is directed as shown in Figure 3, from the feed rolls, first over, and then under member 87, as previously described. This manner of threading keeps the inked face of the ribbon out of contact with the non-rotative guiding devices, thus avoiding smudging and other difficulties.

For typing offset process stencils, type impressions for which are made on the front of the work sheet, the roller 89 and guide rod 90 are arranged as shown in Figure 5, that is, in their forward positions. For this kind of work, the ribbon passes in front of the work sheet and has its inked face rearward. Note that in this instance the roller 89 is vertically aligned with the front of the guide rod. This allows the ribbon coming off the roller to pass first in front of, and then around the guide rod, thus keeping the inked face off the rod. At the rear guiding device 87, the ribbon in this

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instance passes from the feed roll, first under, and then over member 87, as illustrated in Figure 5. Thus, in this instance as well, the ribbon travels over the carriage without having its inked face coming in contact with the non-rotative guiding devices.

Installing and reusing the ribbon

The roll of ribbon as supplied to the consumer may be provided with both a leader strip and a trailer strip of non-inked ribbon, see Figure 11. These strips are releasably attached, as by means of non-drying adhesive, to the opposite ends of the hectograph ribbon and may be wound in assembled relation on the roll core 78, in readiness to be installed on the typewriter. After placing the roll of ribbon on the supply spool 15, the leader strip is payed off this spool in an initial amount enough to start the threading through the route on the carriage. As threading through each unit of the feeding and guiding devices is done, an additional strip of ribbon is pulled from the spool. When the leader strip is fully threaded on the carriage, from one feed roll to the other, the leading end of the strip is attached, as by an adhesive thereon, to an empty core 78 on the take-up spool 18. With the carriage returned to line-start position, the leader strip is then wound up on the spool 18, at least to an extent to bring the ink ribbon across the span at the front of the platen. The machine is now ready for stencil typing.

No further attention to the ribbon is required until the ribbon supply has been exhausted from the supply spool 15, as will be manifest by the appearance of the trailer strip on the carriage, as shown in Figure 12. It is now necessary to transfer the full ribbon roll to the supply spool 15, in order that the unused band of ribbon may be used. Preparatory to doing this, the portion of the inked ribbon remaining on the carriage is wound onto spool 18 so that the trailer strip races over the entire ribbon route on the carriage and its two ends are adjacent the spools 15, 18 as shown in Figure 13. After disconnecting the trailer strip from the hectograph ribbon, the roll of ribbon is transferred to the supply spool, and the empty core is put on spool 18, with the trailer strip attached. After winding the trailer strip on supply 18 and setting lever 97 to elevate the ribbon so that the unused band is registered with the printing line, the machine is ready for further typing.

The use of the leader strip permits threading the ribbon into the machine without soiling the hands, and the use of the trailer strip eliminates rethreading once the machine has been threaded. Each time a new roll of hectograph ribbon is required, the trailer strip is positioned on the carriage as shown in Figure 13, after which the new ribbon roll may be installed merely by placing same on the supply spool and attaching the end of the inked ribbon to the trailer strip and by attaching the opposite end of the trailer strip to an empty core on the take-up spool. Before typing it is, of course, necessary to advance the inked ribbon to an extent so that it spans the front of the platen. This may be conveniently done by manually advancing the carriage upon release thereof from letter feed control, meanwhile holding the ribbon clamp 23 released by pulling the lower shoe 25 down against the tension of spring 30, thereafter returning the carriage with the clamp allowed to grip the belt. The carriage may be reciprocated in this manner and the clamp may be operated as described

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until the inked ribbon is advanced to a proper extent on the carriage.

Second embodiment of the invention

The modification illustrated in Figures 15 and 16 is distinguished from the form of the invention first described, mainly in that it embodies electrical means for operating the ribbon feed mechanism under control of the character keys of the typewriter. That is, the clutch or belt clamp of the ribbon feed is electro-magnetically actuated, in this embodiment. The second form also includes a modification of the brake mechanism which cooperates with the ribbon feed drive to check rotation of the drive under certain conditions of operation, the brake mechanism of this form being electro-magnetically actuated.

Referring to Figure 15, the ribbon feed mechanism of this modification includes the feed rolls 16 and 17 on the carriage, the latter of which is shown, and further includes feed roll driving means in the form of the endless belt 20 driving the two pulleys 21 and 22 supported by brackets 24 on the carriage and operatively connected to the respective feed rolls. The clutch device in this embodiment, however, comprises a clamp 100 that is operated by an electro-magnetic device or magnet 101. This clutch device is likewise carried on the main frame of the machine by a bracket 102. The bracket carries a lower, fixed shoe 103 of the clamp, which extends under the upper run of the belt 20. A movable shoe 104 of the clamp is arranged to engage the upper face of belt 20 and is pivoted on the bracket 102, having a spring 105 pressing said shoe toward the fixed shoe 103 to grip the belt. Shoe 104 provides an armature which, when attracted by the energized magnet 101, unclutches the belt from the main frame.

The mode of operation of the ribbon feed mechanism in this form is substantially the same as that described for the first form and is illustrated in Figures 9 and 10. That is, when a character key is depressed, the clamp 100 is thereby released, so that during the ensuing letter feed advance of the carriage the ribbon advances bodily with the carriage and thus effects ribbon feed. The clamp is released by energizing magnet 101, by means later described. Clamp 100 is normally held closed by spring 105. Therefore, carriage movements, incident to which the magnet 101 is not energized, cause the belt to drive the feed rolls and thus move the ribbon on the carriage to the same extent in the opposite direction that the carriage moves, with the result that no ribbon feed occurs.

When carriage advance incident to a character key depression releases the clamp 100, the unrolling of the ribbon from spool 18 exerts a pull that tends to rotate feed roll 17 and possibly move the carriage-carried ribbon when such movement is not desired. To guard against this, said feed roll is held stationary concomitantly with release of clamp 100 by an electro-magnetic brake 107 acting on the associated drive pulley 22. A magnet 108 of this brake may be energized by the same means that energizes clamp magnet 101, and an armature 109 of the brake has an arm adapted to frictionally engage said pulley. Thus, when clamp 100 is released brake 107 applies the braking power to pulley 22 that resists rotation of feed roll 17.

Current is supplied to each of the magnets 101 and 108 by an electric circuit which is normally

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open at a switch 110. Spring tension of one of the switch members urges the switch to open. The switch is closed, incident to depression of a character key, by the universal bar 8 which, as described in the first embodiment, operates the letter-feed escapement mechanism 4 to advance the carriage in letter-space steps. Switch 110 includes an actuating lever 111 with which the universal bar 8 is engageable to close the switch.

In order to have the clamp 100 remain open for the duration of the letter-feed step-advance of the carriage, switch 110 is latched in closed condition when the escapement mechanism begins its letter feed operation. Said switch is unlatched and thus permitted to open only when the escapement mechanism is completing the letter feed step. In this modification, the switch is held closed by mechanism shown in Figure 16, similar to that included in the first embodiment shown in Figures 7 and 8 which holds the clamp-releasing plunger 33 in moved position. That is, a slidable latch rod 112, urged by a spring 113 to shift into locking relation with the switch-actuating lever 111, is controlled by the movable dog 36 of the escapement, said dog having a prong 114 engaging a shoulder of the latch rod. As previously described, this movable dog swings rightward and then leftward as the dog carrier 38 is oscillated during a complete operation of the escapement, and this movement of dog 36, in its two phases, first allows the latch rod 112 to engage in back of switch lever 111 under influence of its spring 113, and then in the second phase retracts said rod to free said lever and allow switch 110 to open. Thus the clamp 100 is kept open and brake 107 stays on until the letter-feed escapement completes its cycle of operation by the return of the movable dog 36 to its quiescent position.

In general

Although in this application there are specifically described two embodiments which the invention may assume in practice, it will be understood that the same are shown for the purpose of illustration, and that invention may be modified and embodied in various other forms without departing from its spirit or the scope as defined in the appended claims.

For example, while in its preferred forms the rollers which cause movement of the ribbon in unison with the carriage, are on the carriage, said rollers may if desired be supported on the main frame of the typewriter. Correspondingly, the belt drive to the ribbon-moving rollers may be on the main frame with the rollers, in which case the belt clamp or clutch device would be carried on the carriage and be normally released, so that during non-typing travels of the carriage the ribbon, being held at each roll on the main frame, would merely run through the guiding devices without movement relative to the typing point. In that the drive clutch would be carried on the carriage and would therefore be normally released, the means for operating this clutch by the type actions would cause the clutch to grip the belt, so that during the ensuing letter-feed advance of the carriage the ribbon, being moved bodily with the carriage, would likewise advance relatively to the typing point.

What is claimed is:

1. In a typewriter having type actions for typing at a common point and a travelling paper carriage, in combination, means on the carriage 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 through the guiding means 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 a type action operation, to disable the movement-effecting means whereby the ribbon on the carriage is moved bodily therewith and relatively to the typing point.

2. In a typewriter having type actions for typing at a common typing point and a travelling paper carriage, in combination, means on the carriage for guiding a ribbon in a path along the entire typing line, means, actuated according to travels of the carriage, for driving the ribbon through the guiding means in a direction opposite that of the instant carriage travel, to maintain the ribbon substantially stationary relative to the typing point, and means, under control of the type actions, to momentarily interrupt the ribbon driving means to thereby cause a step of ribbon movement relative to the typing point.

3. In a typewriter having type actions and a travelling paper-carriage letter feedable under control of the type actions, in combination, means on the carriage for supporting and guiding a ribbon in a path along the entire typing line, ribbon-moving means on the carriage, means for driving said ribbon-moving means in unison with travel of the carriage and in directions such that the ribbon is moved oppositely to the instant carriage travel, and means responsive to a type action operation, to momentarily disable said driving means, to cause the ribbon to take a letter-feed step with the carriage.

4. In a typewriter having type actions, a main frame and a travelling carriage, in combination, means on the carriage for supporting and guiding a ribbon in a path along the entire typing line, ribbon-moving means on the carriage, means, including a clutch on the main frame, for driving said ribbon-moving means in unison with travel of the carriage and in directions such that the ribbon is moved oppositely to the instant carriage travel, and means, operable by the type actions, respectively, for releasing said clutch.

5. In a typewriter having type actions and a travelling carriage, in combination, means on the carriage for supporting and guiding a ribbon in a path along the entire typing line, ribbon-moving means on the carriage, means including a clutch for driving said ribbon-moving means in unison with travel of the carriage, electromagnetic means for releasing said clutch, and means, operable by the type actions, for energizing said clutch-releasing means.

6. In a typewriter having type actions and a travelling carriage in combination, means on the carriage for supporting and guiding a ribbon in a path along the entire typing line, ribbon-moving means on the carriage, means including a clutch for driving said ribbon-moving means in unison with travel of the carriage, electromagnetic means for releasing said clutch, an electromagnetic brake device cooperative with said ribbon-moving means, and means, operable by the type actions, for energizing said clutch-releasing means and said brake device.

7. In a typewriter having type actions and a travelling paper carriage under control of a letter feed escapement mechanism, in combination, means on the carriage for guiding a ribbon in a path along the entire typing line, means actuated according to travels of the carriage for driving

the ribbon through the guiding means in a direction opposite that of carriage travel, means, under control of the type actions to interrupt the ribbon-driving means, and means under control of the escapement mechanism, to maintain said drive-interrupting means effective for the duration of a letter-feed step of carriage movement.

8. In a typewriter having type actions, a travelling paper carriage and an escapement mechanism for letter feeding the carriage, in combination, means on the carriage for guiding a ribbon in a path along the entire typing line, means, actuated according to travels of the carriage, for driving the ribbon through the guiding means in a direction opposite that of carriage travel, means, under control of the type actions, to interrupt the ribbon driving means, the escapement mechanism including a movable dog, and means operable by said movable dog, to latch said drive-interrupting means, when operated, in operated condition to assure interruption of the drive for the duration of the letter-feed step of carriage movement.

9. In a typewriter having type actions and a travelling paper carriage, in combination, means on the carriage for guiding a ribbon in a path along the entire typing line, rollers on the carriage, one adjacent each end thereof, for moving the ribbon through the guiding means, means for driving at least one of said rollers in synchronism with travels of the carriage to cause ribbon movement in a direction opposite that of the instant carriage travel and at a rate corresponding to that of the carriage travel, and means, operable in response to a type action operation, to momentarily disable said roller driving means.

10. In a typewriter having type actions, a main frame and a travelling paper carriage, in combination, means on the carriage for guiding a ribbon in a path along the entire typing line, rollers on the carriage, one adjacent each end thereof, for moving the ribbon through the guiding means, means on the carriage for driving said rollers in synchronism with travels of the carriage to cause ribbon movement in a direction opposite that of the instant carriage travel and at a rate corresponding to that of the carriage travel, said driving means including a releasable connection to the main frame, and means, operable by the type actions, to release said main frame connection.

11. In a typewriter having type actions, a main frame and a travelling paper carriage, in combination, means on the carriage for guiding a ribbon in a path along the entire typing line, rollers on the carriage, one adjacent each end thereof, for moving the ribbon through the guiding means, mechanism for driving said rollers including a drive belt reaching between said rollers and a clutch device carried on the main frame and releasably clutching said belt, to cause rotation of said rollers in harmony with the travels of the carriage, and means, operable by the type actions, to release said clutch device.

12. In a typewriter having type actions, a main frame and a travelling paper carriage, in combination, means on the carriage for guiding a ribbon in a path along the entire typing line, rollers on the carriage, one adjacent each end thereof, for moving the ribbon through the guiding means, pulleys, one adjacent each end of the carriage and operatively connected respectively with said rollers, an endless drive belt travelling over said pulleys, a device carried on the main frame releasably engaging said belt, to cause rotation of said rollers and consequent movement

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of the ribbon in response to travels of carriage, and means operable by the type actions to momentarily release said belt-engaging device.

13. In a typewriter having type actions, a main frame and a travelling paper carriage, in combination, means on the carriage for guiding a ribbon in a path along the entire typing line, rollers on the carriage, one adjacent each end thereof, for moving the ribbon through the guiding means, pulleys, one adjacent each end of the carriage and operatively connected respectively with said rollers, at least one of the connections including a one-way drive device, a drive belt travelling over said pulleys, means carried on the main frame releasably engaging said belt to cause rotation of said rollers and consequent movement of the ribbon in response to travels of carriage, and means operable by the type actions to momentarily release said belt-engaging device.

14. In a typewriter having type actions, a main frame and a travelling paper carriage, in combination, means on the carriage for guiding a ribbon in a path along the entire typing line, rollers on the carriage, one adjacent each end thereof, for moving the ribbon through the guiding means, pulleys, one adjacent each end of the carriage and operatively connected respectively with said rollers, a drive belt, travelling over said pulleys, means carried on the main frame and releasably engaging said belt to cause rotation of said rollers and consequent movement of the ribbon in response to travels of carriage, and means operable by the type actions to momentarily release said belt-engaging device, at least one of the said pulleys having a brake device cooperative therewith and a one-way clutch connecting the brake device and its pulley.

15. In a hectograph ribbon-feed mechanism for a typewriter having a travelling paper carriage, two devices for rotatably supporting ribbon spools, means for driving said devices in response to travels of the carriage, and a one-way clutch between said driving means and each of said spool-supporting devices, said clutches being each normally effective and adapted to drive respectively in opposite directions.

16. In a ribbon feed mechanism for a typewriter having a travelling paper carriage, two devices for supporting ribbon spools, each including a rotatable member, means for driving said members in response to travels of the carriage, a one-way clutch between said driving means and each of said rotatable members, said clutches being each normally effective and adapted to drive respectively in opposite directions, and friction means between each said rotatable member and the associated spool supporting device.

17. In a typewriter having type actions, a main frame and a travelling paper carriage, in combination, means on the carriage for guiding a ribbon in a path along the entire typing line, rollers on the carriage, one adjacent each end thereof for moving the ribbon through the guiding means, mechanism for driving said rollers including a drive belt and including a clamp on the main frame urged to grip said belt, means operable by the type actions to momentarily release said clamp, and means, including a movable member and effective upon moving said member, to hold said clamp released.

18. In a hectograph ribbon-feed mechanism for a typewriter having type actions and a travelling carriage, in combination, means on a carriage for guiding a ribbon along the entire typing line, means for driving the ribbon through the guid-

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ing means, means under control of the type actions to momentarily interrupt the driving means, devices for rotatably supporting ribbon spools, driving means for said devices, and means, including a movable member and effective upon moving said member, to disable said interrupting means and said device-driving means.

19. In a hectograph ribbon-feed mechanism for typewriters, in combination, means for supporting and guiding a ribbon for travel linearly along the entire typing line at the front of the typewriter platen, said means being alternately conditionable for supporting the ribbon along the typing line either in front of or in back of a work sheet on the platen and comprising a supporting member and guiding devices thereon adjacent each end of the platen, said guiding devices being alternatively positionable on the supporting member at two different locations relative to the platen.

20. In a hectograph ribbon-feed mechanism for typewriters, in combination, means for supporting and guiding a ribbon for travel linearly along the entire typing line at the front of the typewriter platen, said means being alternately conditionable for supporting the ribbon along the typing line either in front of or in back of a work sheet on the platen and comprising a supporting member adjacent each end of the platen, a roller and a diagonal guide on each said supporting member, said member having provision for positioning said roller and guide in two arrangements at different space relations to the platen.

21. In a typewriter having a paper carriage movable to letter feed, word-space, tabulate, and return, in combination, means, including ribbon-moving rollers, on the carriage for moving and guiding a ribbon in a path along the typing line, and means, effective incident to certain of said carriage movements excepting the letter-feed movements, to rotate at least one of said rollers in synchronism with the certain carriage movements, to cause ribbon movement along the typing line path in a direction opposite that of the instant carriage movement.

22. In a typewriter having a paper carriage movable to letter feed, word-space, and return, in combination, means, including ribbon-moving rollers, on the carriage for guiding a ribbon in a path along the typing line, means, effective during certain of said carriage movements excepting the letter-feed movements, to rotate at least one of said rollers to cause ribbon movement along said path in a direction opposite that of the instant carriage movement, and means, effective during the letter-feed steps, to render the roller-rotating means ineffective, to cause momentary interruption of said ribbon movement.

23. In a typewriter having a paper carriage movable to letter feed, word-space, back-space, tabulate, and return, in combination, means on the carriage for guiding a ribbon in a path along the typing line, ribbon-moving rollers on the carriage, roller-rotating means operative in response to movements of the carriage, and means to render said roller-rotating means effective incident to certain of said carriage movements excepting the letter-feed movements, to cause the ribbon to move along said path during the certain carriage movements.

24. In a typewriter having a paper carriage movable to letter feed, word-space, tabulate, and return, in combination, means to guide and move

a ribbon in a path along the typing line including spaced ribbon-moving rollers on the carriage, mechanism operative to drive at least one of said rollers in response to certain movements of the carriage including a drive belt reaching between 5 said rollers and a device on the main frame for releasably engaging said belt, and means to render said device effective incident to certain of said carriage movements excepting the letter feed movements, to cause the ribbon to move along 10 said path during the certain carriage movements.

25. In a typewriter having type actions for typing at a common point and a travelling paper carriage, in combination, means on the carriage for guiding a ribbon in a path along the entire 15 typing line, means effective during certain non-typing travels of the carriage, to cause movement of the ribbon through the guiding means 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 20 during stepping of the carriage incident to typing, to disable the movement-effecting means to thereby cause a step of ribbon movement relative to the typing point.

26. In a typewriter having types operable on a member for movement thereon to a common printing point, a work-sheet supporting member, means to letter-feed said members relatively incidental to operations of said types, whereby 30 printing impressions are made along a typing line

on the work-sheet supporting member, means to effect relative movements of said members to extents other than letter-feeding steps, and means to guide and move a transfer ribbon along the typing line, including means operable by relative movement of said members and controlled by operation of said types, to maintain the ribbon stationary relatively to the work-sheet support during the letter-feeding steps and to maintain the ribbon stationary relatively to the type-supporting member during the other relative movements of said members.

27. In a typewriter having types operable on a member for movement thereon to a common printing point, a work-sheet supporting member, means to letter-feed said members relatively incidental to operations of said types, whereby printing impressions are made along a typing line on the work-sheet supporting member, means to effect relative movements of said members to extents other than letter-feeding steps, and means to guide and move a transfer ribbon along the typing line, including clamping means controlled by operation of said types and effective upon relative movement of said members, to maintain the ribbon stationary relatively to the work-sheet support during the letter-feeding steps and to maintain the ribbon stationary relatively to the type-supporting member during the other relative movements of said members.

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