Sept. 28, 1965 M. B. EMIG 3,208,575

PAPER FEED MECHANISM FOR TYPEWRITER

Filed Aug. 26, 1964 4 Sheets-Sheet 1

FIG. 1

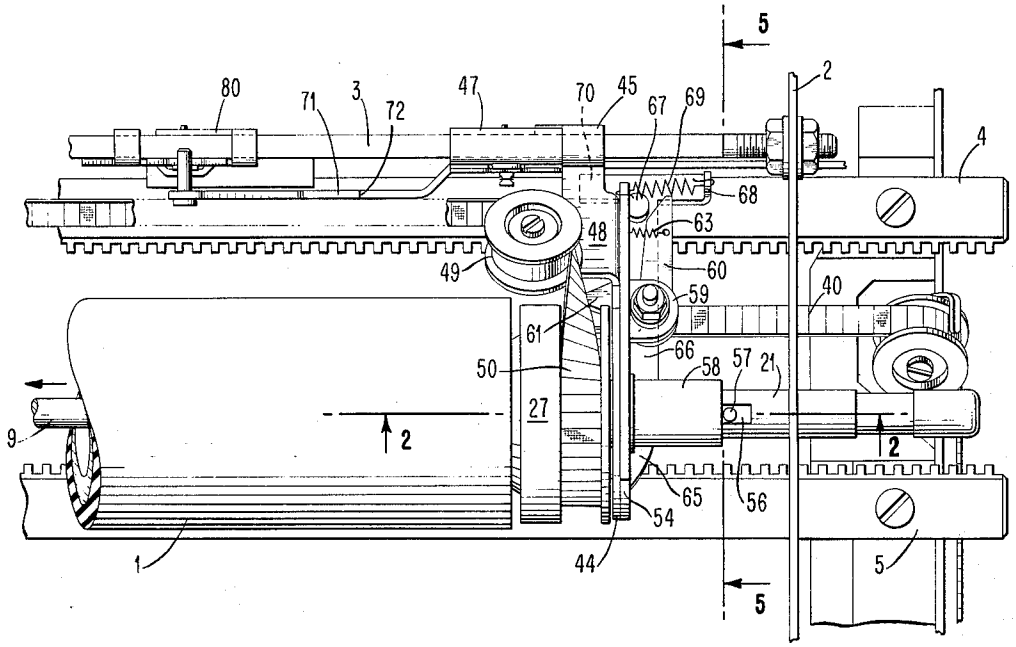
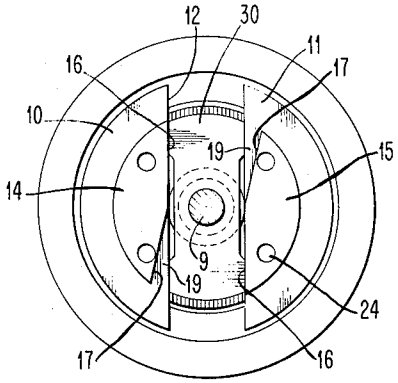


FIG. 4



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PAPER FEED MECHANISM FOR TYPEWRITER

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FIG. 3

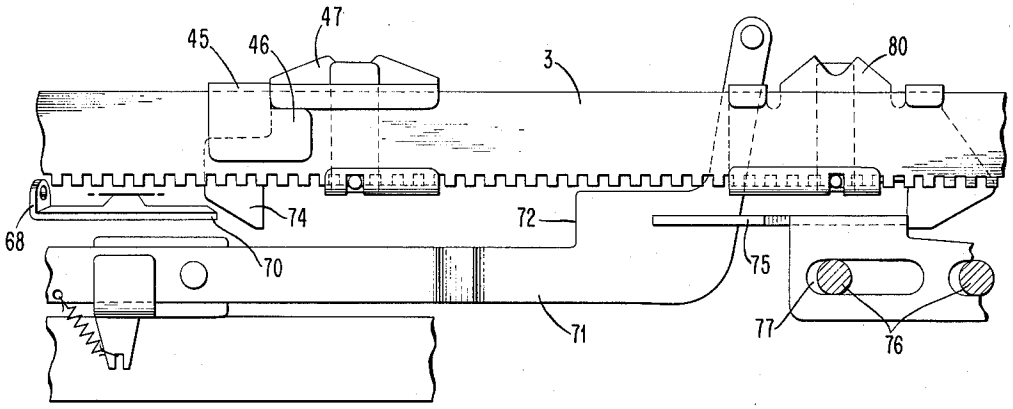
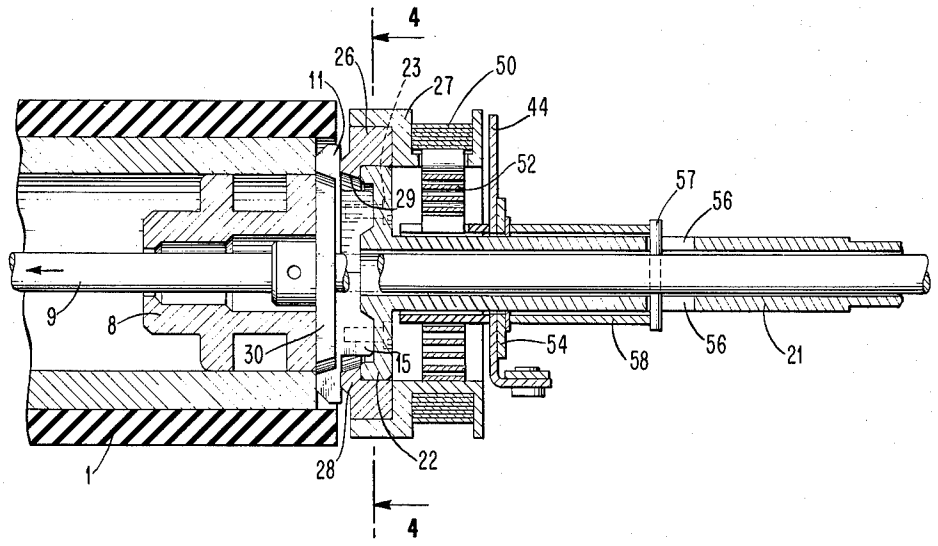


FIG. 2



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PAPER FEED MECHANISM FOR TYPEWRITER

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FIG. 5

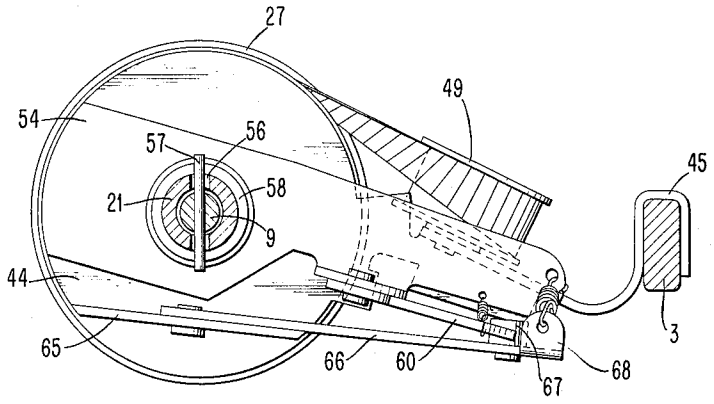
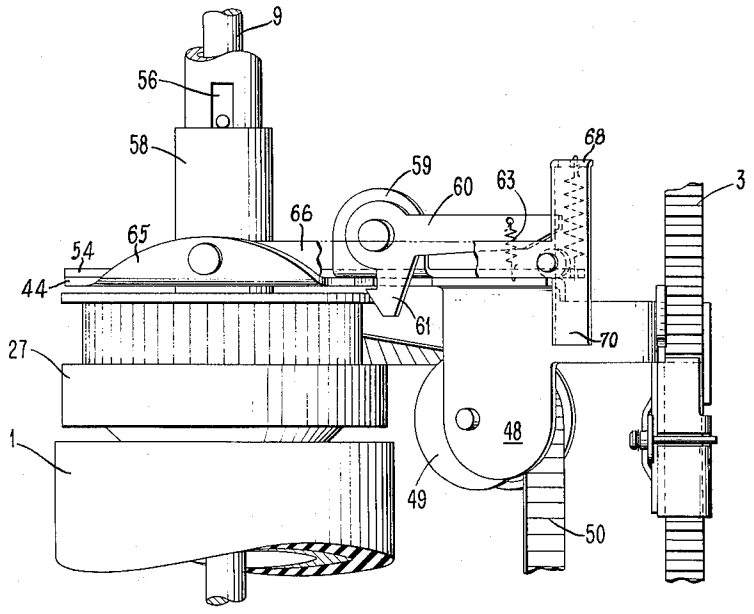


FIG. 6



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PAPER FEED MECHANISM FOR TYPEWRITER

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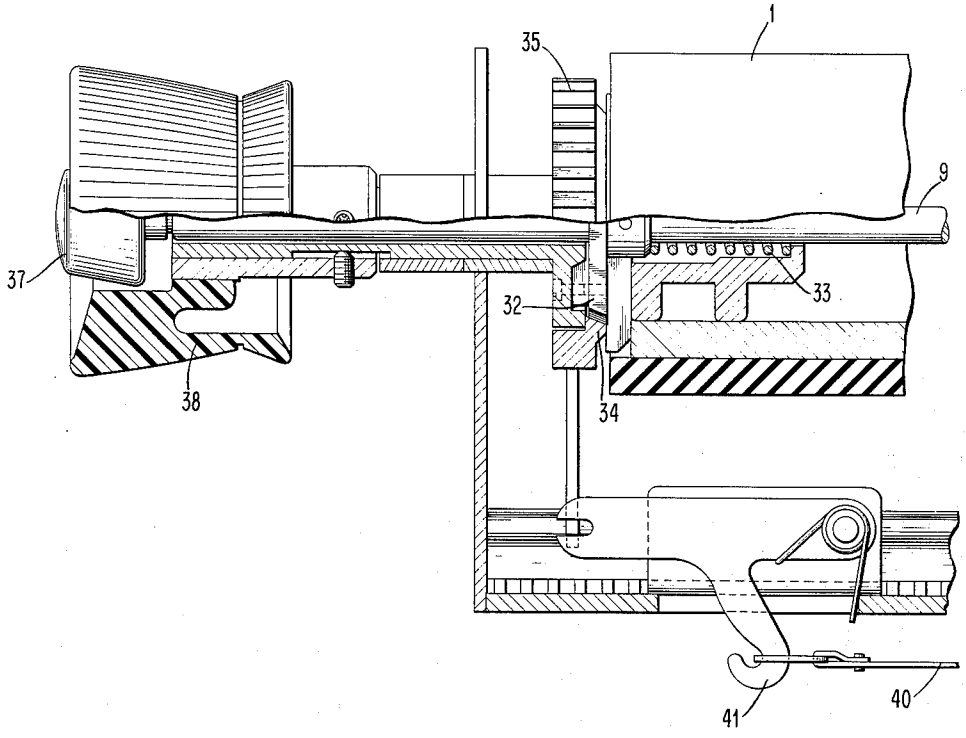
FIG. 7



United States Patent Office 3,208,575 Patented Sept. 28, 1965

3,208,575

PAPER FEED MECHANISM FOR TYPEWRITER

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Filed Aug. 26, 1964, Ser. No. 393,810
13 Claims. (Cl. 197—127)

This invention relates to paper feed mechanisms for typewriters, and more particularly to mechanisms which operate automatically to feed sheets of paper in response to carriage movements.

This application is a continuation-in-part of my United States patent application entitled Paper Feed Mechanism for Typewriter, Serial No. 95,553, filed March 14, 1961, now abandoned.

It is sometimes necessary that a large number of envelopes have different addresses typed upon them. The first line of the address may start at approximately two inches from the top edge of the envelope and the last line may be spaced one to two inches from its lower edge. When using a conventional typewriter, the operator must rotate the platen manually to feed an envelope to the position at which the first line is typed and then rotate it again for removing the envelope after the last line is typed. Considerable energy is expended in performing these operations. The same problem exists when typing information at selected positions on forms or record sheets of any type.

The carriage of an IBM electric typewriter is moved by a motor in a carriage return direction and is moved in the opposite direction by a spring under the control of an escapement pawl. In accordance with this invention, by making use of the carriage movement in a return direction to drive a pulley which is clutched to the platen, a feeding of an envelope or sheet of paper may be obtained during this time. As soon as the return movement is completed, the clutch may be disengaged to permit either manual rotation of the platen or rotation by the usual line spacing mechanism. After the last line has been typed, the carriage may be moved by a tabulating operation to a position in which the clutch is re-engaged. When carriage return again takes place, the platen is driven once more to eject the first sheet and, at the same time, to feed a second sheet to a position for typing.

An object of this invention is to provide an improved mechanism for feeding paper in a typewriter.

Another object is to provide an improved mechanism which is clutched to a typewriter platen on movement of the carriage by tabulation to a certain position and operates during return movement of the carriage for driving the platen in a paper feeding direction.

Yet another object is to provide a mechanism for driving a typewriter platen in response to carriage return movement and adapted to be disconnected from driving relation with the platen when the return movement is completed.

Other objects of the invention will be pointed out in the following description and claims and illustrated in the accompanying drawings, which disclose, by way of example, the principle of the invention and the best mode, which has been contemplated, of applying that principle.

In the drawings:

FIG. 1 is a plan view showing the right end portion of a typewriter carriage and its supporting means.

FIG. 2 is a vertical sectional view of the platen and its driving means taken on the plane of the line 2—2 of FIG. 1.

FIG. 3 is a rear elevational view showing margin stops mounted on the margin rack and cooperating with margin control mechanisms.

FIG. 4 is a view taken on the plane of the line 4—4 in FIG. 2 with the pulley removed.

FIG. 5 is a vertical sectional view taken on the plane of the line 5—5 in FIG. 1.

FIG. 6 is a view looking upwardly at the lower side of the mechanism shown in FIG. 5.

FIG. 7 is a view partially in vertical section showing the left end portion of the platen.

Referring to the drawings, and more particularly to FIGS. 1 and 2, it will be noted that there is shown a portion of a platen **1** which is rotatably supported at its right end by a plate **2** forming part of a typewriter carriage. Extending parallel to the platen at its rear side is a margin rack **3** connected to the plate **2** and moving with the carriage along stationary guide rails **4** and **5**. The platen **1** is of cylindrical shape, and extending into the right end of the platen with a force fit is a member **8** (see FIG. 2) having an axial opening through which a shaft **9** passes with clearance about its periphery. Formed integral with the member **8** are two segmental portions **10** and **11** (FIGS. 2 and 4) overlying the end of the platen and spaced from each other to form a groove or slot **12**. Projecting from the segmental portions **10** and **11** are two more reduced segmental portions **14** and **15**, each having a face **16** lying in the same plane as the inner face of the portion from which it projects. Each of the portions **14, 15** also has a face **17** extending at an angle to the inner face of the portion from which it projects so as to provide surfaces **19** on the portions **10** and **11** at points diametrically opposite the axis of the shaft **9**. The need for these surfaces will be made clear later in the description.

As shown in FIG. 2, arranged in axial alignment with the shaft **9** is a tubular member **21** having a circular flange **22** formed on its left end. Screws **23** extend through openings in the flange **22** and are received within threaded openings **24** (FIG. 4) in the portions **14, 15** for securing the tubular member **21** to the member **8**. The plate **2** (FIG. 1) rotatably supports the member **21**, and the shaft **9** extends through this member with a slight clearance. Rotatably mounted upon the circular flange **22** is an annular member **26** (FIG. 2) which has a force fit within a recessed side of a reel **27**. Formed on the annular member is a portion **28** projecting inwardly between the circular flange **22** and the segmental portions **10, 11** for holding the reel against axial displacement. The inner edge of the portion **28** is provided with a beveled surface **29** which is serrated as shown in FIG. 2. As best shown in FIG. 2, fixed to the shaft **9** is a clutch plate **30** which has a loose sliding fit within the groove or slot **12** between the segmental portions **10** and **11**. The ends of the plate **30** are beveled and arcuate as shown in FIG. 4, and serrations are formed on these ends for engagement with the serrations on the surface **29** of the annular member **26**.

At the left end of the platen is a mechanism, FIG. 7, by which rotation of the platen is normally effected. This mechanism is substantially the same as that shown and described in U.S. Patent 2,737,280 issued to R. D. Dodge et al. Connected to the shaft **9** adjacent the left end of the platen is a clutch plate **32** which is normally urged by a spring **33** to a position in which it engages a ring shaped member **34** for connecting the latter to rotate with the platen. Formed on the ring member are ratchet teeth **35** with which a detent, not shown, cooperates for holding the platen in selected line positions. When the clutch plate **32** engages the ring member **34**, the shaft **9** is held by the spring **33** in such a position that the clutch plate **30** (FIG. 2) is free of the surface **29** on the annular member **26**. Fixed to the left end of the shaft **9** is a button **37** (FIG. 7) which may be actuated manually for moving the shaft **9** to the right and feeing the

clutch plate 32 from the ring 34. A knob 38 may then be actuated for rotating the platen free of the detenting action. With the shaft held in its left hand position, the platen may be rotated either through the knob 38 or through the action of a carriage return tape 40 on a bellcrank 41 to effect a stepping of the ring member 34. With the shaft 9 moved to its extreme right hand position, the clutch plate 32 is disengaged from the ring member 34 and the clutch plate 30 (FIG. 2) is connected through the annular member 26 to the reel 27.

Mounted on the tubular member 21 adjacent the reel 27 is a plate 44 which extends rearwardly and is provided at its rear end with a hooked portion 45 (FIG. 1) fitting over the margin rack 3. A shoulder 46 on the hooked portion fits under the right hand margin stop 47 so it is held in place on the rack. Between the ends of the plate 44 is a flange 48 rotatably supporting a pulley 49 about which a tape 50 passes. This tape is wrapped about the reel 27 and then passes about the pulley 49 to a stationary anchor, not shown, adjacent the left side of the typewriter. Arranged within the reel 27 is a helical spring 52 which is connected at its inner and outer ends to a horizontal projection of relatively stationary plate 44 and the reel 27, respectively. This spring acts to bias the reel 27 in a counter clockwise direction as viewed in FIG. 5, and effect a winding of the tape thereon as slack in the tape is produced by carriage movement. Although a flange is shown in FIG. 2 extending from plate 44, it will be noted that the helical spring 52 is connected at only one point on the flange.

At the outer side of the plate 44 is another plate 54 having an opening through which the tubular member 21 extends. This opening is slightly larger than the diameter of the member 21 so it permits a swinging of the plate 54 about an axis perpendicular to the shaft 9. Formed in the tubular member 21 at opposite sides are elongated slots 56 through which the ends of a pin 57 carried by the shaft 9 extend. Slidably mounted on the tubular member between the plate 54 and the pin 57 is a sleeve 58 through which the plate 54 acts when pivoted in a clockwise direction in FIG. 1, to move the shaft 9 to the right in response to force from the pin 57. Formed on the plate 54 is a flange 59 on which an L-shaped latch member 60 is pivotally mounted. The lower leg of the latch member extends to the left in FIG. 1 and carries a hooked portion 61 (FIG. 6) engageable with an edge of the plate 44 for holding the plate 54 in the position shown. A spring 63 connected between the plate 54 and the latch member tends to hold the latter in its latched position.

Projecting from the plate 44 beneath the shaft 9 is a flange 65, and pivotally mounted on this flange is a T-shaped member 66 which extends rearwardly under the latch member 60. Adjacent the rear end of the member 66 is a button 67 (FIG. 1) projecting upwardly into the path of the latch member 60. One of the arms 68 on the member 66 is connected by a spring 69 to the rear end of the plate 54. When the plate 54 is held by the latch member 60 in the position shown in FIG. 1, the button 67 engages a lower edge of the plate 44 to hold the T-shaped member 66 in the position shown against the action of the spring 69. The other arm 70 of the T-shaped member lies in the path of a lever 71 which is operable to position margin stops on the margin rack 3. Lever 71 is shown herein only because it is provided with a shoulder 72 (FIG. 3) which is engaged by the arm 70 of the T-shaped member as the carriage moves from right to left (left to right as shown in FIG. 3) during a tab operation. It will be noted that lever 71 is found on typewriters sold in large numbers by the assignee of this invention. The manner in which the lever 71 is pivoted down manually to release a catch on a selected margin stop, at which time the carriage is then moved under the released margin stop to reposition the margin stop is thus well known and need not be detailed here.

The lever 71 is of interest to this invention because it forms a convenient location for a shoulder 72 with which the arm 70 can engage. It need only be noted here for complete clarity that the lever 71 is manually rotatable on a pivot, but is normally spring biased to the stationary position shown in FIG. 3, the pivot point being such that the arm 70 will move before sufficient force is developed to move the lever 71 against its bias.

Upon engagement of the arm 70 with the shoulder 72, the T-shaped member 66 is caused to pivot relative to the carriage in a clockwise direction in FIG. 1. This engages the button 67 with the latch member 60 and causes the latter to be rocked to a position in which it becomes unlatched from the plate 44. The swinging of the T-shaped member also results in an increase in the tension of spring 69 until the plate 54, now released by the latch, swings also in a clockwise direction. Projecting downwardly from the margin stop 47 is an abutment portion 74 (FIG. 3) which engages a stop member 75 and moves the latter until it is arrested by stop pins 76 extending through slots 77 in the member. The parts are dimensioned so that movement of the carriage is terminated by the stop member soon after the latch 60 is released and the plate 54 is rocked by the spring 69.

Swinging of the plate 54 by the spring 69 causes the sleeve 58 (FIG. 1) to slide along the tubular member 21 in a direction to act on the pin 57 and cause the shaft 9 to move to the right in FIG. 2. The clutch plate 30 moves with the shaft until it engages the surface 29 on the member 26, thereby connecting the pulley 27 in driving relation with the platen. If the carriage is now moved to the right while the clutch plate 30 is held in engagement with the surface 29, the platen will be driven in a paper feeding direction since the tape 50 will act to rotate the reel 27 against the action of spring 52.

Movement of the carriage to the right or in a carriage return direction is effected by the tape 40 which is operated by mechanisms shown and described in U.S. Patent 2,872,013 to B. W. Wittwer. As shown by this patent, a clutch is applied on actuation of a carriage return key to connect a reel to a motor for winding up the tape 40. When tension on the tape 40 is first increased, the bellcrank 41 (FIG. 7) is actuated for stepping the ring member 34 to rotate the platen a predetermined amount if the clutch plate 32 is in its operative position. If the carriage has just been moved to the left until arrested by the right margin stop 47, as explained above, the shaft 9 is shifted to the right and the clutch plate 32 is free of the ring 34. Rocking of the bellcrank 41 by the tape 40, therefore, has no effect on the platen. Continued winding in of the tape 40 however causes the carriage to travel to the right. As the carriage starts moving to the right, the tape 50 causes the reel 27 to rotate in a clockwise direction in FIG. 4. The clutch plate 30 is engaged with the surface 29 on the ring 26, and the left side of the clutch plate in FIG. 2 lies just to the right of the right hand surface on the segmental portions 10 and 11. The action of the reel 27 on the clutch plate 30 is such as to rotate the latter clockwise in FIG. 4 until it engages the surfaces 17 on the segmental portions 14 and 15. At this time it lies over the surfaces 19 on the portions 10, 11 and is held by the latter in engagement with the surface 29. Further movement of the carriage to the right results in a decrease in the tension of spring 69 but the shaft 9 cannot move to the left since it is held by the clutch member 30 which remains latched on the surfaces 19.

The carriage continues moving to the right as shown in FIG. 1 by the reeling in of tape 40 until a left hand margin stop 80 (FIG. 3) actuates the stop member 75 to disengage, as described by Patent 2,872,013, the clutch which controls the driving of the reel for tape 40. Upon disengaging the clutch for tape 40, the carriage moves slightly further to the right under inertia and produces a slack in the tape. The carriage then settles back to the

left until it is held by escapement pawls, not shown. As the carriage moves to the left, the reel **27** is rotated by the spring **52** in a counterclockwise direction in FIG. 4. The clutch plate **30** is also rotated in this direction with the reel **27** until it is free of the surfaces **19** on the segment portions **10** and **11**. Shaft **9** is then moved to the left by the spring **33** (FIG. 7), breaking the connection between the clutch plate **30** and the reel **27** while reengaging the clutch plate **32** with the ring **34**.

With the carriage moved to the position in which it is stopped by the right margin stop **47**, the clutch plate **30** engages the surface **29** for connecting the reel **27** in driving relation with the platen **1**. A sheet of paper or an envelope is then placed in a position to be fed by the platen when the latter is rotated. The carriage return key is then actuated to cause the carriage to be moved to the right until it is stopped by the action of the left hand margin stop **80** on the stop member **75**. During this time, the platen is driven by the tape **50** in a direction to feed the paper or envelope. The distance of paper feed is approximately equal to that of carriage movement but may be made some other value by varying the diameter of the reel **27**. It will be appreciated that a sheet of paper must be fed about two and one-half inches before one end of it reaches a point at which information may be typed along the end. If the first line is to be typed two inches from the top edge, then the paper must be fed four and one-half inches before typing starts. With a ratio of paper feed to carriage movement equal to one, then the carriage would have to travel four and one-half inches during return movement. This would permit a typing of lines slightly less than this in length without affecting the clutch mechanism controlling the driving of the platen. If the first line is to be typed a greater distance from its top edge, then the left hand margin stop **80** is moved further away from the stop **47** so the carriage must travel a greater distance during its return movement. As the carriage travel increases, the length of line which may be typed also increases. The four and one-half inch line mentioned above is usually sufficient for the typing of addresses on envelopes. The point at which any typed line begins may be determined by positioning the paper guide.

As soon as the last line is typed, the operator actuates a tab key to cause the carriage to move to the left until it is stopped by its right hand margin stop **47**. This reengages the clutch plate **30** with the reel **27** for driving the platen during carriage return movement. Before actuating the carriage return key, another sheet of paper or envelope is placed in back of the platen. As the carriage is then returned by actuation of the return key, the first sheet of paper or envelope is ejected while the second is fed into position for typing.

Summary

In summary, it should be clear that a clutch in combination with elements and movements found in a typewriter is used to achieve automatic feed of the paper. The specific embodiment detailed sets out what might be called movement stops, which are operative upon tabulation and at the end of a carriage return operation. Means are provided to clutch the platen to a reel in response to carriage movement just prior to the termination of movement by the tabulation movement stop. A relatively stationary structure **44** is provided in the preferred embodiment to which the spring **52** is anchored to thereby assure that the spring **52** never is turned beyond preselected limits of tension. It is clear that each reciprocation of the carriage tightens and relaxes the spring **52** the same amount. Relaxation of the system when movement is stopped by the carriage return movement stop allows the spring **52** to take up inherent slack and thus move the clutch into an unlatched position. The spring **33** (FIG. 7) acting through pin **57** (FIG. 1) biases the remainder of the clutching mechanism into normal position so that upon unlatching the mechanism is pulled into the position shown in FIG. 1. The system can function indefinitely, and the paper also can be fed manually in the prior art manner as often as desired.

While there has been described in this application one form which the invention may assume in practice, it will be understood that it may be modified and embodied in various other forms without departing from the spirit or the scope of the appended claims.

What is claimed is:

1. In a typewriter having a platen rotatably supported on a movable carriage:

a mechanism adapted to be connected to said platen for driving the latter in a paper feeding direction during the movement of said carriage in one direction, said mechanism comprising, in combination,

a reel,

means rotatably supporting said reel on said carriage in axial alignment with said platen,

a tape wound around said reel and connected at its outer end to a stationary point on said typewriter,

bias means tending to rotate said reel in a direction to wind tape thereon,

a clutch element,

means connecting said clutch element to said platen for rotation therewith but permitting it to move bodily relative thereto, said clutch element being engageable with said reel for connecting the latter in driving relation with said platen,

means yieldingly urging said clutch element to a position free of said reel,

means operative when said carriage reaches one position to force said clutch element into engagement with said reel,

and means to hold said clutch element into said engagement until said carriage reaches a second position.

2. The mechanism of claim **1** in which said tape operates to drive said reel and said platen in a paper feeding direction when said carriage is moved with said clutch element engaging said reel.

3. The mechanism of claim **2** also including a movement stop operative to stop said carriage at said second position to allow said bias means to rotate said reel to unlatch said clutch element to allow said yielding means to free said clutch element.

4. In a typewriter having a platen rotatably supported on a movable carriage:

a mechanism adapted to be connected to said platen for driving the latter in a paper feeding direction during the movement of said carriage in one direction, said mechanism comprising, in combination,

a reel,

means supporting said reel at one end of said platen for rotation on an axis coinciding with the axis of said platen,

a tape wound about said reel and connected at its outer end to a stationary point on said typewriter,

bias means tending to rotate said reel in a direction to wind the tape thereon,

a shaft extending axially through said platen and said reel,

means supporting said shaft for longitudinal movement relative to said platen and said reel,

a clutch element connected to said shaft,

means coacting with said clutch element for connecting said platen to said shaft for rotation therewith but permitting relative actual movement therebetween, said clutch element being engageable with said reel for connecting the latter in driving relation with said platen,

yieldable means normally holding said shaft in a position in which said clutch element is free of said reel,

means operative when said carriage reaches one position to link carriage movement to said clutch ele-

ment to force said clutch element into engagement with said reel,

and means to hold said clutch element into said engagement until said carriage reaches a second position.

5. The mechanism as in claim 4 wherein said means to hold said clutch element includes means operable upon rotation of said reel after said clutch element has been engaged therewith for latching said clutch element into engagement with said reel, and also including a margin stop operative to stop said carriage at said second position to allow said spring to rotate said reel in the opposite direction after cessation of movement to effect an unlatching of said clutch element to allow said yieldable means to free said clutch element.

6. The mechanism of claim 5 wherein said one position is the left hand position of said carriage and said second position is the right hand position of said carriage whereby said tape operates to drive said platen to feed paper in a direction from top to bottom past the print position of said typewriter.

7. The mechanism of claim 5 also comprising a margin stop for stopping movement of said carriage when said carriage is forced to the right and also in which said means to force said clutch element into engagement with said reel comprises,

a member supported on said shaft for pivotal movement about an axis extending at right angles to the axis of said shaft,

means including a pin fixed to said shaft and acting on said member through force provided by said yieldable means for holding said member normally in a position at an angle to said shaft, said member operating when pivoted from its normal position for moving said shaft in a direction to engage said clutch element,

and means positioned to be operative just before said carriage is stopped by said right margin stop for forcing said member to pivot from its normal position.

8. The mechanism of claim 7 in which said means positioned to be operative for forcing said member to pivot comprises,

a lever mounted on said carriage for pivotal movement about an axis extending parallel to the pivot axis of said member,

a spring connected between the outer ends of said lever and said member,

a relatively stationary element engageable by the other end of said lever just before said carriage engages said right margin stop, said lever being caused to pivot as it is held by said element during continued carriage movement, and the pivotal movement of said lever causing an increase in tension of said spring until said member is pivoted from its normal position.

9. In a typewriter having a platen rotatably supported on a movable carriage a mechanism for rotating the platen in a paper feeding direction during movement of said carriage in a return direction, said mechanism comprising, in combination,

a reel rotatably supported on said carriage in axial alignment with said platen,

a tape wound around said reel and connected at its outer end to a stationary point on said typewriter,

bias means tending to rotate said reel in a direction to wind said tape thereon,

a clutch element carried by said platen and movable into clutching engagement with said reel,

means permitting a limited rotation of said clutch element with said reel relative to said platen to effect a latching of said clutch element in its clutching position,

means yieldingly urging said clutch element to position free of said reel when unlatched from the latter,

a pair of margin stops for limiting movement of said carriage,

means positioned to be operative immediately before said carriage moves during a tabulating operation into position to be stopped by one of said margin stops for forcing said clutch element into engagement with said reel, said tape then operating on movement of said carriage in a return direction for driving said reel and said clutch element therewith in a direction to effect a latching of the latter and on continued movement of said carriage to drive said platen in a paper feeding direction,

and means operating on engagement with the other of said margin stops for arresting movement of said carriage and permitting overdrive movement under inertia of said carriage to produce a slack in said tape to allow said bias means to rotate said reel and said clutch element in a direction to effect an unlatching of the latter as said carriage settles back in a position in which said carriage is held.

10. In a typewriter having a platen rotatably supported on a movable carriage a mechanism adapted to be connected to said platen for driving the latter in a paper feeding direction during movement of said carriage in one direction, said mechanism comprising, in combination,

a reel,

means rotatably supporting said reel on said carriage in axial alignment with the platen,

a tape wound around said reel and connected at its outer end to a stationary point on said typewriter,

bias means tending to rotate said reel in a direction to wind tape thereon,

a clutch element,

means connected with said platen and slotted to allow said clutch element to move relative to said platen to engage said reel, said slotted means having a recessed surface formed to engage said clutch element,

means yieldingly urging said clutch element to a position free of said reel,

means operative when said carriage reaches a right hand position to link carriage movement to said clutch element to force said clutch element into engagement with said reel to allow said reel to pull said clutch element into a latched position on said recessed surface.

11. The combination as in claim 10 also including a left hand margin stop operative to stop said carriage when it is forced to the left to allow said bias means to rotate said reel to unlatch said clutch element to allow said yielding means to free said clutch element.

12. The mechanism of claim 11 also comprising a right hand margin stop and in which said clutch element is connected to a shaft extending axially through said platen and said reel and supported for longitudinal movement relative to said platen and said reel, and in which said means for moving said clutch element into engagement with said reel comprises,

a member supported on said shaft for pivotal movement about an axis extending at right angles to the axis of said shaft,

means including a pin fixed to said shaft and acting on said member through force provided by said yieldable means for holding it normally in a position at an angle to said shaft, said member operating when pivoted from its normal position for moving said shaft in a direction to engage said clutch element,

and means positioned to be operative just before said carriage is stopped by said right hand margin stop for forcing said member to pivot from its normal position.

13. The mechanism of claim 12 in which said means positioned to be operative for forcing said member to pivot comprises,

a lever mounted on said carriage for pivotal movement about an axis extending parallel to the axis of said member,

a spring connected between the outer ends of said lever and said member,

a relatively stationary element engageable just before said carriage engages said right hand margin stop, said lever being caused to pivot as it is held by said element during continued carriage movement, and the pivotal movement of said lever causing an increase in tension of said spring until said member is pivoted from its normal position.

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ROBERT E. PULFREY, *Primary Examiner.*