Nov. 20, 1962 M. B. EMIG 3,064,790

OPEN END CARRIAGE

Filed May 5, 1961 2 Sheets-Sheet 1

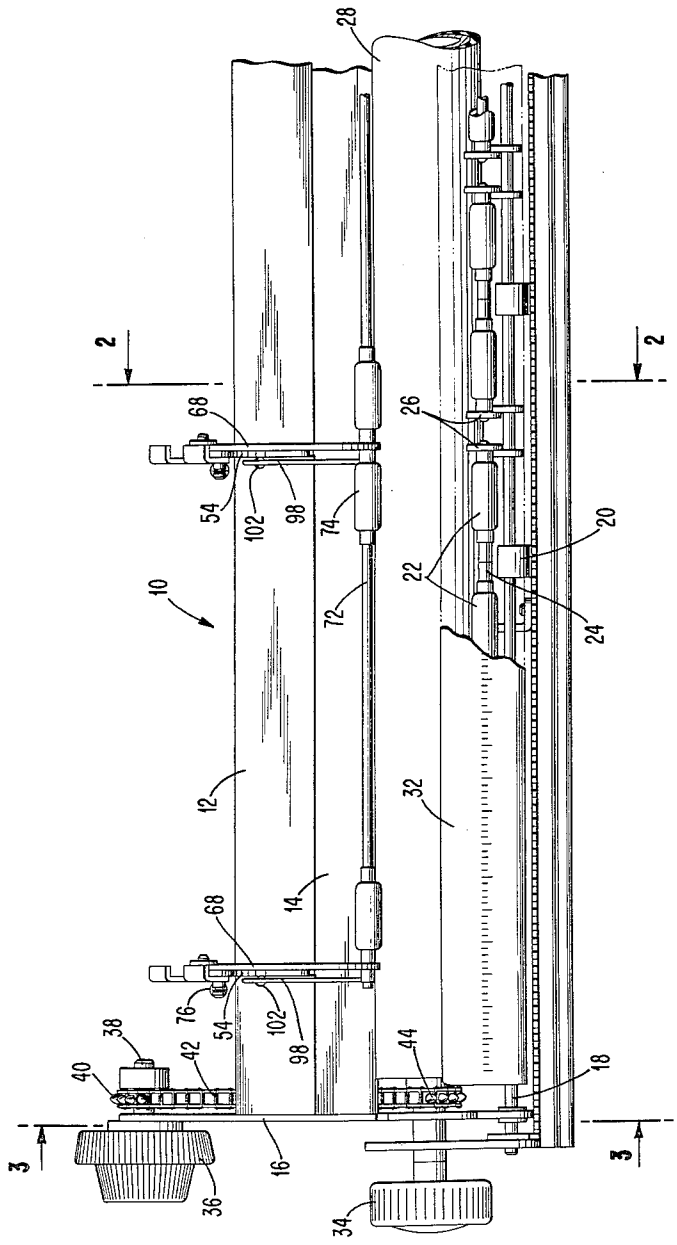


FIG. 1

INVENTOR.

MARSDEN B. EMIG

BY Karl A. Ohralik

ATTORNEY.

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FIG. 2

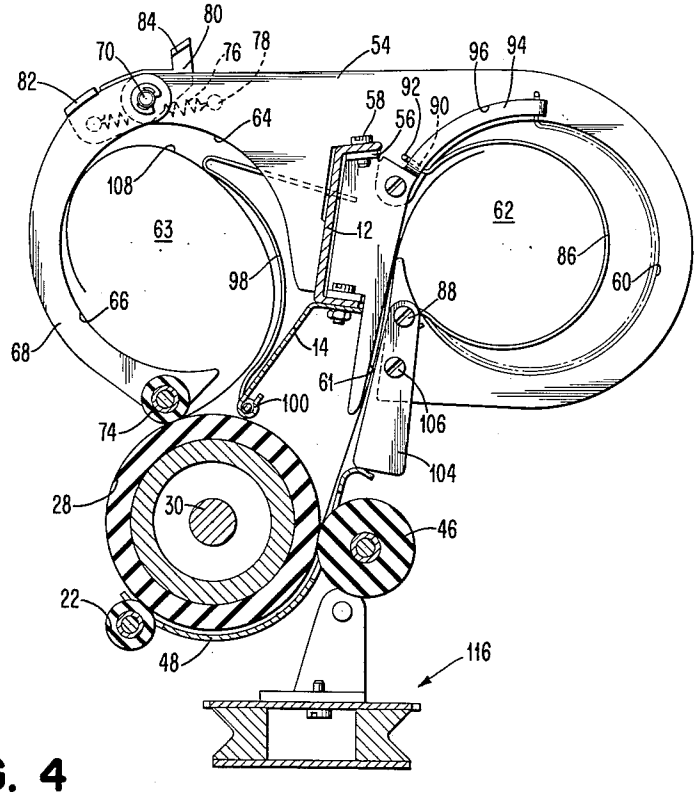


FIG. 4

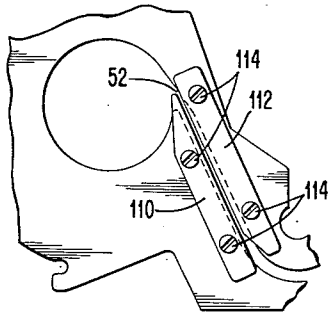
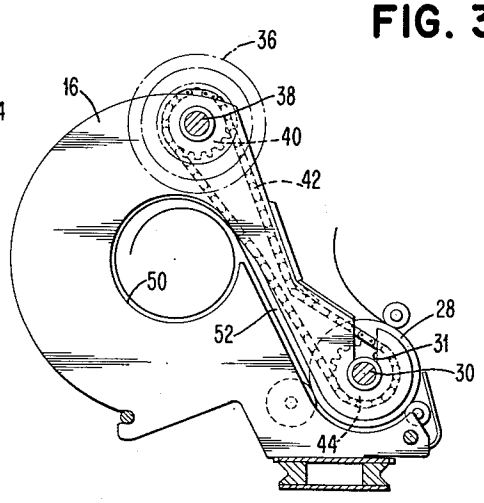


FIG. 3



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OPEN END CARRIAGE

Marsden B. Emig, Lexington, Ky., assignor to International Business Machines Corporation, New York, N.Y., a corporation of New York

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This invention relates to a typewriting machine and more particularly to a carriage construction of such a machine, enabling the automatic use of unusually wide and long sheets of paper.

In some types of work such as the preparation of large drawings, it is necessary to include considerable written information on a large sheet of paper. It has been recognized that, the usual lettering procedures of draftsmen either strictly by hand or with the aid of lettering instruments, are satisfactory except for the long time required for doing such extensive lettering. It has been proposed to overcome this difficulty by the provision of a typewriting machine for accommodating large sheets and wherein the sheet extends from one storage receptacle in which it is initially wound, over the platen and to another storage receptacle in which it winds up. In such prior arrangements, the line by line advance of the paper is not automatic in the manner achieved in usual typing because the relatively great bulk of the sheet and the relatively high friction between the sheet and the parts against which it passes causes so much resistance to movement that the sheet will buckle and fold when attempts are made to advance it in the usual manner. This is particularly so when the "take-up" receptacle contains a number of turns of the paper and feeding additional paper to this receptacle requires it to be wound in a decreasing spiral and there is friction between all adjacent turns of the paper. For a number of turns, this friction becomes very large. Heretofore, such sheet advance has therefore been made manually by the typist after typing each line. Frequently, an elongated dowel-like member is used for winding and unwinding the respective ends of the sheet. This in itself is time consuming and inconvenient.

It is therefore an object of this invention to facilitate the automatic paper advance, line by line, in a typewriter accommodating unusually large sheets of paper.

It is another object of this invention to obviate the use of dowel-like rods for winding unusually large paper sheets in a typewriter capable of accommodating the same.

In accordance with this invention, the adverse effects of high resistance to line-by-line paper sheet advance in a typewriter accommodating unusually large sheets and having storage receptacle from which it is drawn and into which it is driven is overcome by reducing the friction and resistance to paper wind-up in the storage receptacles and by providing for increased compressive drive in the sheet. The reduced friction is facilitated by the provision of resilient members extending within the storage receptacle and preferably being in a plane transverse to the axis of the receptacle. The members are yieldable to enable successive turns of the sheet fed into a storage receptacle to allow the roll to increase in size by the sheet thickness for each turn rather than maintaining a fixed outer roll diamter and requiring the inner dimensions of the roll to reduce for each turn. In this manner, as each turn of the sheet is added to the outer periphery of the roll, the roll turns as a unit and there is no friction between adjacent turns of the sheet. Thus, the initial turns of the roll may be relatively small in diameter when compared with the diameter of the storage receptacle whereby many additional turns may be added after the initial turn. As the turns are added, the roll finally becomes as large as the diameter of the receptacle and the resilient members yield to this limit.

The guide paths to each storage receptacle may be made very thin to prevent the buckling or folding of the paper as it is driven by compression. Thus, any resistance presented to the movement of the paper is more readily overcome without adverse effect.

The foregoing and other objects, features and advantages of the invention will be apparent from the following more particular description of a preferred embodiment of the invention, as illustrated in the accompanying drawings.

FIGURE 1 is a partial front view of a typewriter carriage incorporating the present invention,

FIGURE 2 is a cross sectional view of the carriage shown in FIGURE 1 taken along lines 2—2 therein,

FIGURE 3 is a side view of the carriage shown in FIGURE 1 and showing an end plate thereof, and

FIGURE 4 is a partial view of a modification of the end plate shown in FIGURE 3.

Referring now to the drawings for a detailed description of the invention, 10 represents generally an entire carriage of a typewriter in which the present invention is incorporated. The carriage includes a pair of frame members 12 and 14 extending between and rigidly secured to end plates, one of which is shown at 16. A steel rod 18 also extends between the end plates and is secured at intermediate points along its length by bracket members such as shown at 20 attached to a rigid frame member, not shown.

The rod 18 supports a plurality of feed bails each having a pair of resilient rollers 22 made of rubber or other suitable material and which are rotatably mounted on shafts 24. For supporting each shaft 24, each end thereof is mounted in an arm 26 which in turn is supported by the rod 18. The rollers 22 are biased against a platen 28 having an outer surface portion of hard rubber or other suitable material. As shown more clearly in FIGURE 3 of the drawings an inner shaft 30 of the platen 28 is supported at its ends by recesses 31 in end plates such as shown at 16. A paper scale 32 is also mounted on rod 18.

The platen 28 is directly rotatable by a nob 34 having a knurled periphery and being connected to the shaft 30. In cases wherein the knob 34 is not readily accessible, the platen may be directly rotated by a knob 36 being coupled to a shaft 38 which is rotatable in end plate 16. A sprocket 40 is mounted for rotation on the shaft 38 and is effective to drive a chain 42 engaging the teeth on another sprocket 44 mounted on and rotatable with shaft 30.

A rear paper roll 45 made of resilient material such as rubber, is mounted in any suitable manner so as to contact platen 28 and hold a sheet or sheets of paper firmly against the platen. A curved paper guide 48 extends between feed rolls 22 and 46 and is in relatively close proximity to the platen 28.

As shown more clearly in FIGURE 3 of the drawings, each end plate 16 is provided with a circular opening 50 forming a part of a storage receptacle and the opening 50 is in communication with an elongated paper slit 52, generally tangential to the opening 50. The slit 52 is curved at its end remote form opening 50 and emerges from the plate at its extremity. Another part of each storage receptacle for paper sheets on the carriage is formed by a plurality of plate members the edges of which are shown at 54 in FIGURE 1 of the drawings and the side of one is clearly depicted in FIGURE 2. The plates 54 are secured to and supported by the frame member 12 such as by a lip 56 protruding transversely of the plate 54 and being fastened to the member 12 by a screw 58. Each plate 54 is provided with a circular opening 60 which is in communication with a paper slit 61 generally tangential with the opening 60. The openings 50 and 60 are in alignment with each other and in the aggregate form one receptacle 62 for the paper sheets utilized.

For forming another paper receptacle 63, each plate 54 includes an arcuate recessed portion 64 which together with the concave surface portion 66 of an arm 68 forms an oval opening. These openings are also in alignment and in the aggregate form another paper storage receptacle. One end of each arm 68 is pivotally mounted with respect to the plate 54. A round pivot 70 extending through both the plate 54 and end of arm 68 provides such a mounting. A paper bail having an elongated rod 72 extending through the ends of the arms 68 and rollers 74 of resilient rubber or other suitable material mounted on the rod, is provided. In the position of the arms shown in FIGURE 2, the bail rollers are urged against the platen to securely hold a sheet or sheets of paper against the platen by toggles at the respective pivots. For biasing the arms 68 one end of a spring 76 is secured at 78 to the plate 54 and the other end of the spring is secured to a rocker arm 80 also pivotal about the pivot 70. The rocker arm is provided with lips 82 and 84 which limit its pivotal movement by contact with arm 68 and plate 54, respectively. In the position shown, the rocker arm 80 and spring 76 are off center with respect to the pivot 70 to urge the arms 68 and bail rollers 74 against the platen. As noted, the paper may be considerably wider than the carriage. For typewriting on any portion of its width, the paper may simply be slid with respect to the carriage to any appropriate position for typing thereon.

In accordance with a feature of this invention each of the openings forming a part of a paper sheet receptacle, is provided with a resilient, arcuate shaped member with an axial projection protruding into the opening. A curved spring member 86 is rigidly secured at one end to the plate 54 as by a screw 88. Spring 86 may extend in a plane immediately adjacent to the plane of plate 54, into the opening 60 although the spring may be offset with respect to the plate. The spring 86 in its relaxed state is of a smaller loop cross-section than opening 60 and terminates in an outward, generally radial, protrusion 90. The outer free end of the protrusion 90 has a short axial extension 92. For confining the movement of the free end of the spring 86, an arcuate guide 94 along the periphery of opening 60 is provided for the protrusion 90 and the axial extension 92 is limited in its inward radial movement by the outer, arcuate shoulder 96 of the guide 94. In its expanded position, the spring 86 assumes a shape shown in dotted lines wherein its radius of curvature is substantially the same as that of opening 60.

Similarly, the openings formed by arcuate surfaces 64 and 66 are provided with resilient spring members such as shown at 98. Each member is secured at one end to the frame member 14 as shown at 100 in FIGURE 2 of the drawings. The spring member 98 is preferably in the plane adjacent to plate 54 or may protrude somewhat obliquely into the opening formed by surfaces 64 and 66. For guiding the spring 98 and restricting its movement transverse to the plate 54, it is bent back whereby its free end extends through and is guided by a slot 102 in the frame member 12.

In operating a typewriter having a carriage incorporating the described feature of this invention, a large sheet of paper which may be considerably longer than any standard sheet used in typewriters and considerably wider than the carriage 10, is formed in a spiral roll and inserted in the opening 60 with the spring 86 against the outer surface of the roll of paper. Depending upon the size of the roll, the spring 86 may assume any position from that shown in solid lines to that shown in dotted lines in FIGURE 2 of the drawings or any position intermediate to these two positions. The end of the sheet is first manually drawn through slit 61, between the platen 28 and rear feed rolls 46, around the platen, between the platen and front feed rolls 22, further around the platen, between bail rolls 74 and the platen and into the receptacle formed by surfaces 64 and 66. The paper guide 48 and another paper guide 104 which is secured to plate 54 by a screw 106, aid in directing the paper. In this position, the paper is rather tightly gripped between the platen and each of the feed rolls and bail and rotation of the platen imparts a longitudinal, compressive drive to the paper into the receptacle 63.

Initially, the spring 98 is in the position shown in FIGURE 2 of the drawings and due to its curvature, causes the end of the paper, when forced into the receptacle, to begin the formation of a loop. This is shown at 108 representing a paper in the receptacle. As the paper is automatically advanced, line by line, in typing information thereon, the paper unwinds from the roll in the storage receptacle 62 and winds into a roll in receptacle 63. The initial loop of the roll in receptacle 63 is of a cross-section considerably smaller than that formed by surfaces 64 and 66 and is confined to the area between the resilient member 98 and arm 68. As the paper is advanced, line by line, and forced into receptacle 63, the roll therein becomes larger and larger and the enlargement of the roll causes it to bear harder against the spring 98. However, the spring 98 yields and allows successive turns to be added to the roll without prohibitive resistance. It is to be noted that the action of the spring is such as to yield by a dimension equal substantially to the thickness of the sheet for each turn of the roll being formed. The roll thus rotates as a unit and the resistance to its formation is much less than would be created without the spring 98 wherein the first turn of the roll would be equal in cross-section to the opening formed by surfaces 64 and 66 and additional turns would require all of the turns of the roll to become progressively smaller. Although the usual drive for advancing the paper is sufficiently strong to draw the paper out of the receptacle 62 even without the provision of a spring such as 86, the provision of such a spring provides reversibility whereby the paper may be automatically unwound from a roll in receptacle 63 and wound in receptacle 62. It is to be understood that the springs 86 and 98 cause a roll to progressively diminish in cross-section as paper is being unwound from it in a manner reverse to winding paper on a roll. As another feature, the springs 86 and 98 are effective to grip a roll of paper even ones having only a few turns, sufficiently tight to prevent axial sliding of the roll relative to the carriage receptacle due to inertia effects as the carriage may be returned or otherwise moved back and forth along carriage rail 116. It is to be understood that it is within the purview of this invention to provide other types of resilient members than those shown at 86 and 98. Purely as an example, rather than providing members resilient along their entire lengths, rigid spring biased rigid members may be employed effectively.

As another feature of the invention, the slits 52 and 61 are made so small that a paper sheet under longitudinal compression therein will not buckle. It has been observed that considerable compressive force may be transmitted through a sheet of paper under conditions restricting its lateral movement. As an example, paper sheets of approximately .004 inch thickness were rather forcefully driven through slits of approximately .0045 inch spacing. As shown in FIGURE 4 of the drawings, unusually thin sheets of paper may be advantageously accommodated by further narrowing these slits by a pair of guide plates 110 and 112 attached as by screws 114 to the plate 16 or 54.

From the foregoing description it is clear that a typewriter incorporating a carriage with the features of this invention is capable of accommodating large sheets of paper without manual attention to the sheet for every line of advance of the sheet. It is noted that considerable saving of time and convenience results from exercise of this invention.

While the invention has been particularly shown and described with reference to a preferred embodiment thereof, it will be understood by those skilled in the art that the foregoing and other changes in form and details may be

made therein without departing from the spirit and scope of the invention.

What is claimed is:

1. An apparatus comprising a receptacle for a roll of thin, flexible material and including a plate member having an opening therein, a slit in said plate communicating with said opening for facilitating the movement of said material to and from said opening, a member having a projection protruding into said opening and in one position thereof forming with one surface portion of said opening an area of lesser cross-section than the cross-section of said opening, one end of said member being fixed with respect to said plate and the other portions thereof being resiliently movable from said one position to another position and assuming the contour of a portion of said opening in said other position whereby a sheet of said flexible material forced into said opening through said slit is caused to form a roll of progressively increasing cross-section and said resilient member is moved from said one position toward said other position in response to the enlargement of said roll.

2. An apparatus comprising a plurality of substantially parallel plates each having an opening and a thin slit communicating with the opening therein, said openings being in alignment with each other and said slits being in alignment with each other, a different member having a projection protruding into each of said openings, each member having one end secured to said plate adjacent to said opening and being resiliently movable from a first position within the confines of an opening to a position along the contour of a portion of the opening.

3. An apparatus forming a receptacle for a roll of flexible material comprising a plurality of spaced members each having a concave surface forming an opening and a slit in each member extending from an exterior portion of the member to said concave surface, said concave surfaces being in alignment to accommodate an elongated cylindrical member, a member resiliently mounted and having a curvature greater than the curvature of said concave surface and being movable under force from a position having a projection between opposing portions of said concave surface to near proximity of a portion of said concave surface, whereby the enlargement of a roll of flexible material accommodated in said openings forces said resiliently mounted member toward said portion of said concave surface.

4. An apparatus comprising a first purality of spaced members each having a concave surface and a slit extending tangentially from said concave surface exteriorly of said member, said concave surfaces being in alignment to provide a receptacle for an elongated roll of flexible material and said slits being in alignment to enable extension of said material exteriorly of said receptacle, a second plurality of spaced concave surfaces being aligned with respect to each other but offset with respect to said first plurality of surfaces, a different resiliently movable member in a first position having a projection protruding between opposing portions of each of said concave surfaces, each resiliently movable member being fixed at one end and being resiliently movable from said first position to a second position along a portion of the concave surface, whereby a sheet of flexible material may be contained in either one of said plurality of members and compressively forced into the other plurality thereof and said resilient members are effective to cause said material to form into a roll having an initial turn of greater curvature than said surfaces and to allow the roll to increase in size by the thickness of said material for each additional turn on the receiving roll.

5. A typewriter carriage comprising a platen and a plurality of spaced, substantially parallel members mounted transverse to said platen, each of said members having a first concave surface and a second concave surface, each of said members having a slit extending from an exterior edge thereof to said first concave surface, a plurality of arms each having a concave surface, a different one of said arms being pivotally mounted with respect to a different one of each of said members and the concave surface of each arm being in a plane adjacent to the plane of one of said second concave surfaces, a paper bail having rollers mounted on said arms, said rollers in one position of said arms being engageable with said platen, a resilient member having a projection protruding between opposing portions of each of said first plurality of concave surfaces and a resilient member having a projection protruding between each of said second plurality of concave surfaces and the opposing concave surface of one of said arms, each of said resilient members having one end fixed with respect to one of said parallel members and the other end resiliently movable away from a position between opposing portions of said concave surfaces to a position adjacent to one concave surface portion, said first plurality of concave surfaces forming one receptacle for a roll of flexible material and said second plurality of concave surfaces together with the concave surfaces of said arms forming a second receptacle for a roll of flexible material, whereby a roll of flexible material disposed in either one of said receptacles is extendable between said platen and said rollers over said platen and through said slits to the other of said receptacles and is formed into a progressively enlarging roll in said other receptacle as the resilient members thereof move in response to said enlargement from a position remote from opposing concave surface portions to a position adjacent to one concave surface portion.

6. A typewriter carriage for accommodating large sheets of paper and automatically storing and advancing said paper comprising a first plurality of concave surfaces forming a first receptacle for storing an elongated roll of paper, a plurality of arcuate, resilient members each having one end fixed with respect to one of said concave surfaces and having projections protruding therefrom between and remote from opposing portions of one of said concave surfaces and being resiliently movable against one of said opposing surface portions, a second plurality of concave surfaces and a third plurality of concave surfaces each facing one of said second plurality of concave surfaces and being movable relative thereto, said second and third pluralities of concave surfaces forming a second receptacle, a second plurality of arcuate, resilient members each having one end fixed with respect to one of said second plurality of concave surfaces and in one position having a projection protruding between one of said second plurality and one of said third plurality of concave surfaces and being remote from each, the free portions of each of said second plurality of resilient members being movable from a position remote from said concave surfaces to a position adjacent to one of said second plurality of concave surfaces, whereby a sheet of paper forced under compression into either of said receptacles is caused to form into a roll having a progressively increasing cross-section and the resilient members associated therewith are moved toward one of said concave surfaces.

7. A typewriter carriage for accommodating sheets of paper of unusual proportions comprising a platen and means for rotating the same in discrete increments equivalent to the space of type written thereby, means for storing respective ends of a paper including a pair of receptacles, each receptacle having a plurality of concave surface portions axially aligned to receive an elongated cylindrical roll, a plurality of arms each having a concave surface, each of said arms being pivotally mounted at one end and having its concave surface facing a concave surface of one of said receptacles, a paper bail mounted at the ends of said arms remote from said one ends and having rollers engageable with said platen, a

different, arcuate, resilient member associated with each of said plurality of concave surfaces and having one end fixed with respect to such surface, the remainder of each resilient member being free and having a projection protruding between opposing portions of the concave surfaces of said receptacles, whereby a sheet of paper may extend between said receptacles over a portion of said platen and respective ends of said sheet of paper may be disposed in said receptacles between the concave surfaces of said resilient members and the facing concave surface portions of said receptacles and said resilient members are effective in response to the compressional drive of said sheet into either of said receptacles to cause the same to form a roll of progressively increasing cross-section.

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