

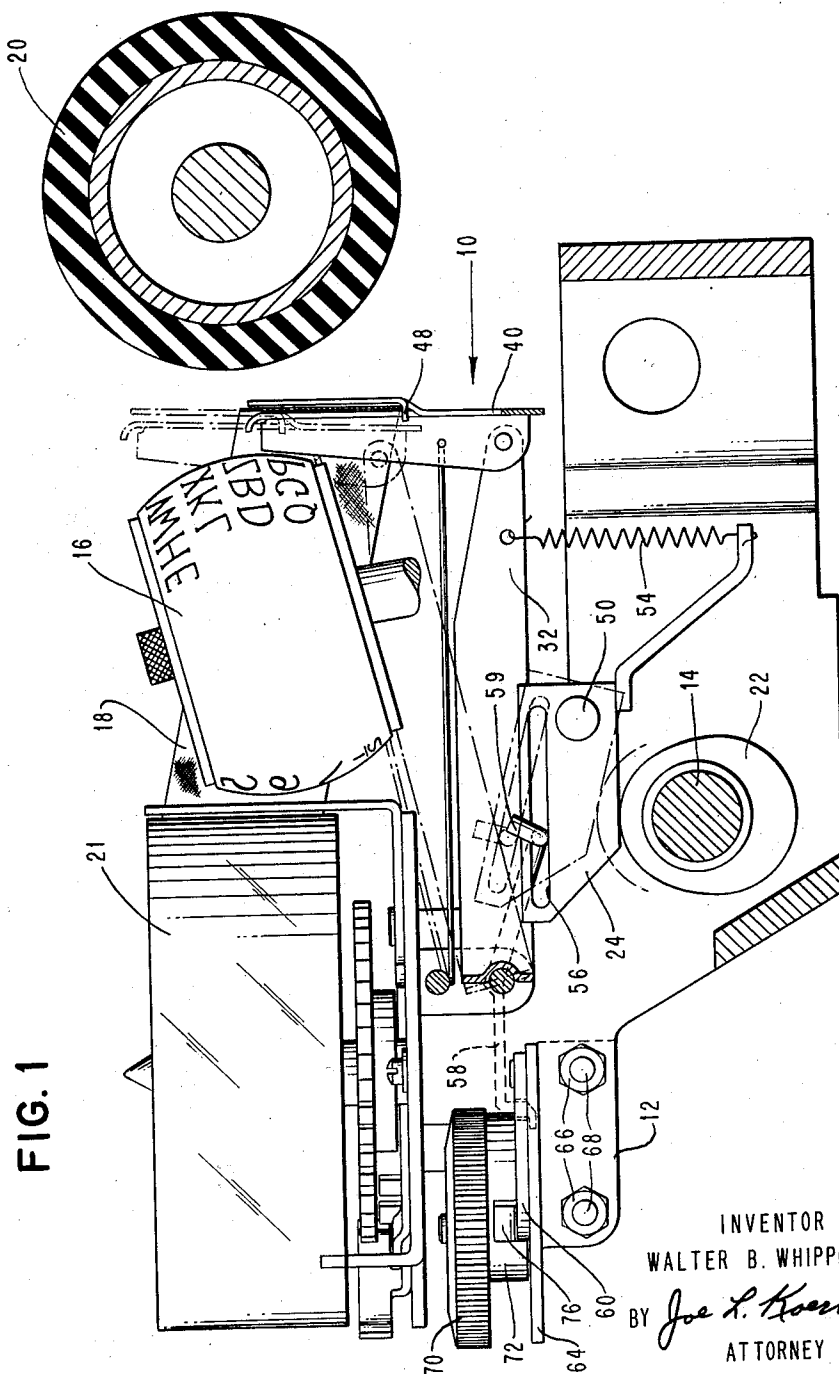
Dec. 29, 1959

W. B. WHIPPO
RIBBON LIFT MECHANISM

2,919,008

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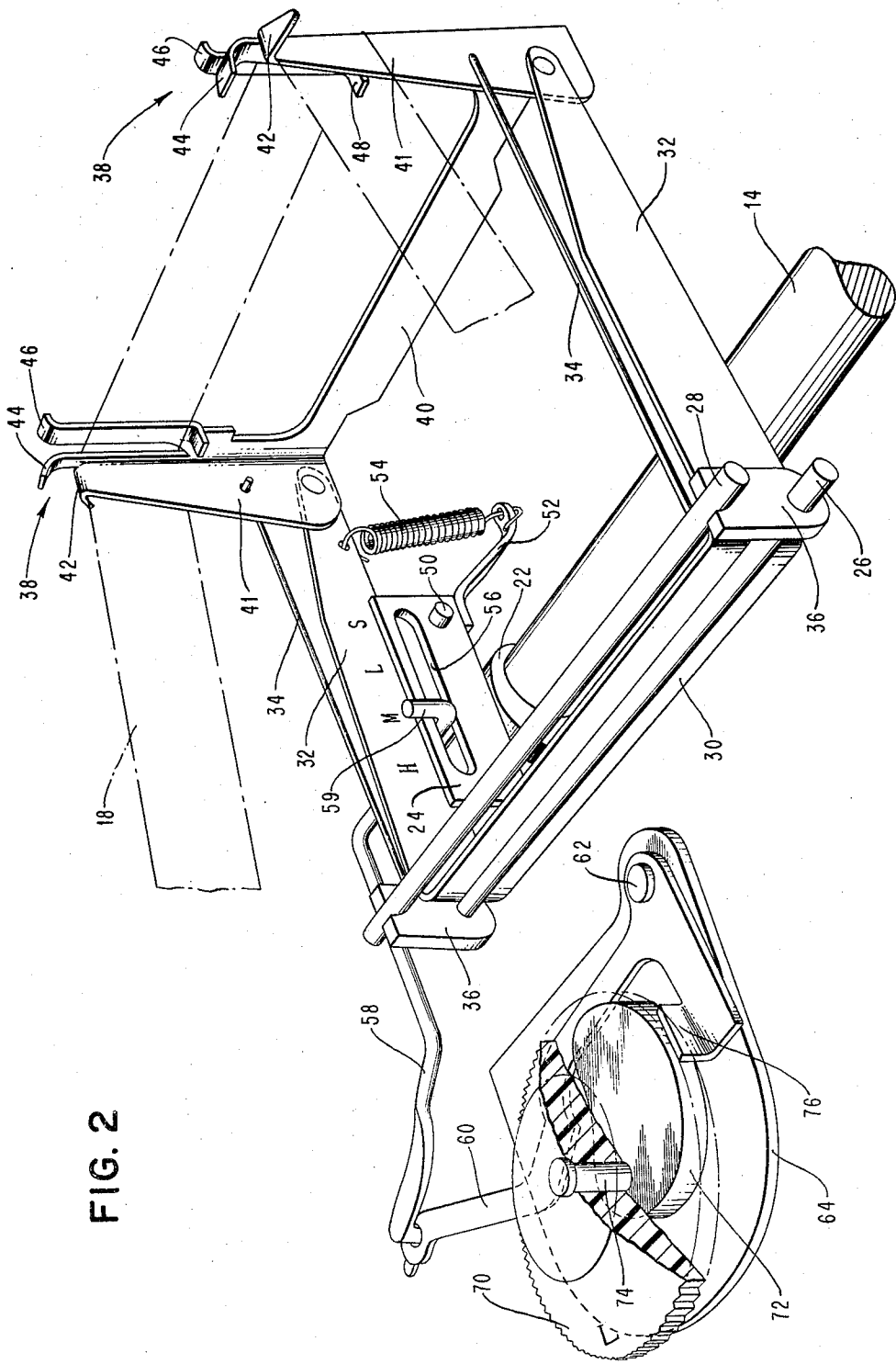
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FIG. 2



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FIG. 3

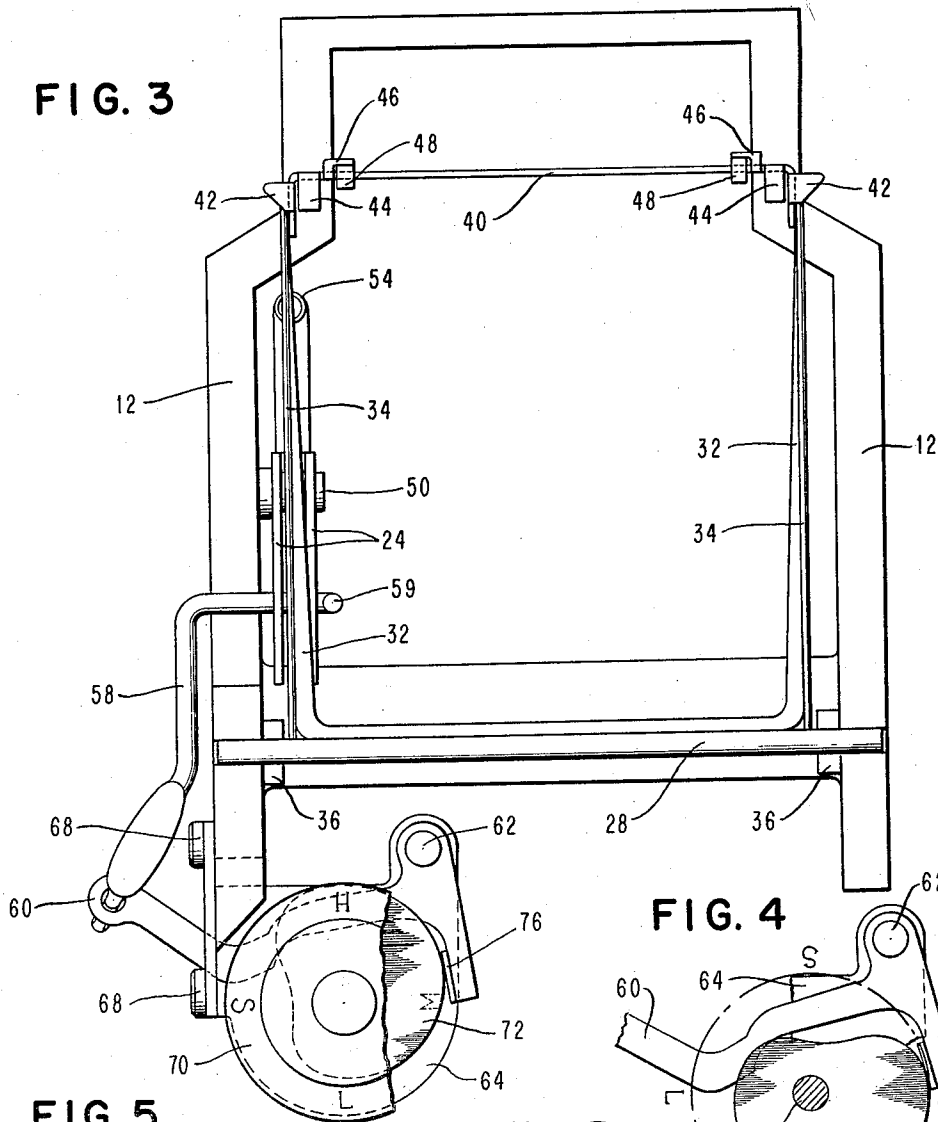


FIG. 4

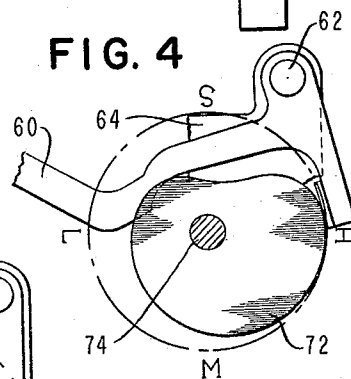


FIG. 5

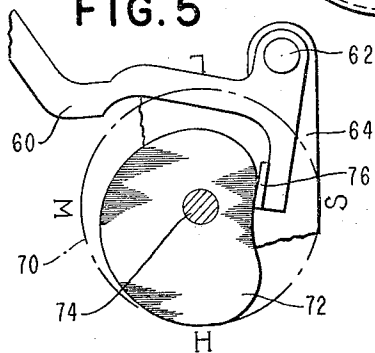
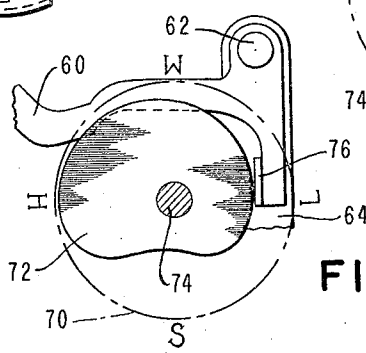


FIG. 6



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2,919,008

RIBBON LIFT MECHANISM

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6 Claims. (Cl. 197—157)

This invention relates to a typewriter ribbon mechanism and more particularly to a device for lifting a ribbon from a position below the print line, variable distances upwardly, into the print line.

It is common practice in the typewriter art to have the ink ribbon rest at a position below the print line to leave the print line visible. It is the usual practice to have a ribbon lift mechanism which is actuated each time a key is operated to lift the ribbon and interpose it between the platen and the actuated type bar. It also is a common expedient to lift the ribbon variable distances for color control or for utilizing different portions of single color ribbon or to inhibit lifting the ribbon during stencil operations.

It is the principal object of this invention to provide an improved ribbon lift mechanism.

A further object of this invention is to provide an improved ribbon lift mechanism having a plurality of lift positions.

Another object of this invention is to provide an improved mechanism for selecting the desired extent of lift.

Still another object of this invention is to provide an improved mechanism for translating a predetermined range of movement of a lift element selectively to variable ranges of movement of a ribbon holder.

Yet another object of this invention is to provide a novel device for snubbing the ribbon guide at the limit of its high lift position in which position it attains its greatest acceleration.

Another object of this invention is to provide a ribbon lift mechanism adapted for movement longitudinally of the platen during a serial printing operation.

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:

Figure 1 is a side elevation partly in section.

Figure 2 is a perspective view.

Figure 3 is a plan view.

Figures 4, 5 and 6 are partial plan views showing successive positions of a selection device.

Referring to Figure 1, a ribbon lift mechanism, generally designated 10, is mounted on a carrier 12 of the type illustrated in a copending application, Serial No. 653,806, filed April 19, 1957, on behalf of Leon E. Palmer, for use with a single print element typewriter wherein the platen is stationary and the single print element is moved along the platen to successive print positions. In the embodiment shown herein, the ribbon lift mechanism moves with the print head across the platen, however, the ribbon lift mechanism could be stationary for use with a conventional typewriter in which the platen moves to successive print positions.

As described in the above cited application, a shaft

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14 is rotated once for each print stroke and operates through a cam (not shown) to throw a print head 16 and a ribbon 18 against a platen 20. The ribbon 18 is contained in a cartridge 21 mounted on the carrier 12. The cartridge 21 is shown in detail in copending application Serial No. 704,195, filed Dec. 20, 1957. A lift cam 22 fixed to the shaft 14 actuates a lift cam follower 24, having a U-shaped cross section, which through a mechanism described hereinafter, lifts the ribbon 18 to interpose it between the print head and the platen.

The plan view of Figure 3 shows the configuration of the carrier 12 in which two rods 26 and 28 are pivotally mounted (see Fig. 2 also). A U-shaped member comprising two lower lift arms 32 is welded along its base section 30 to the rod 26. A second U-shaped member is welded to the rod 28 and comprises upper lift arms 34. Each upper lift arm 34 and the corresponding lower lift arm 32 form opposite sides of parallelograms. A third side of the two parallelograms is formed by members 36 fixed to the rod 26 and pivotally engaging the rod 28. The fourth side of the parallelograms is formed by two ribbon guides generally designated 38 which comprise the upright arms of a U-shaped member 40. The upper and lower lift arms pivotally engage the ribbon guides 38. Each ribbon guide 38 comprises a side element 41 having an upper flange 42 to confine the ribbon 18 from above, a front element 44 to confine the ribbon from the front, a rear element 46 to confine the ribbon from the rear, and a lower flange 48 to support the ribbon from below. A phantom section of ribbon 18 is shown in the ribbon guides in Figure 2.

The lift cam follower 24 is pivotally mounted on the carrier 12 by a stud 50. The cam follower has an extension 52 which is connected by a tension spring 54 to the left hand lower lift arm 32. The spring 54 acts to hold the cam follower 24 against the cam 22. The two sides of the U-shaped lift cam follower 24 each contain a slot 56 through which a control arm 58 extends. The control arm 58 has a turned up end 59 to retain the arm in the slots 56. The control arm 58 is pivotally connected to a selector wheel cam follower 60, the cam follower being pivotally mounted by a stud 62 on a bracket 64 fixed to the carrier 12 by nuts 66 and bolts 68, Figure 1.

A selector wheel 70 having a cam 72 formed integral therewith is rotatably mounted by a pivot 74 on the bracket 64. The selector wheel 70 is marked at 90 degree intervals with the letters S, L, M and H corresponding, respectively, to Stencil, Low Lift, Medium Lift and High Lift. A lug 76 on the cam follower 60 follows the surface of the cam 72 when the wheel 70 is rotated and moves the end of the control arm 58 to positions in the slot 56 required to accomplish the stencil, low lift, medium lift and high lift operations. The corresponding positions have been indicated on the left hand lower lift arm 32 for ready reference. Figures 3, 4, 5 and 6 illustrate the relationship between the position of the cam 72, the cam follower 60 and control arm 58. The control arm 58, in Figures 2 and 3, is adjusted for medium lift as indicated by the M on the wheel 70 opposite the cam follower lug 76. The wheel 70 is detented selectively in each of the four positions by a conventional detent device (not shown) which may be, for example, a spring biased ball in the wheel 70 engageable with detent notches (not shown) spaced at 90 degree intervals in the bracket 64.

The cam follower 24 is lifted through the same range of movement each time the cam 22 is rotated. With the end 59 of the control arm 58 in the S (stencil) position directly over the pivot 50, Figure 2, the control arm is not raised at all when the follower 24 is moved through its range of movement. When the end 59 is in the L

(low) position of the slot 56, the arm 58 is raised a certain increment designated as an L (low) increment which raises the ribbon $\frac{3}{16}$ inch; when the end 59 is in the M (medium) position, the M increment of movement is double the L increment and raises the ribbon $\frac{3}{8}$ inch; and when the end 59 is in the H (high) position, the H increment of movement is triple that of the L increment and raises the ribbon $\frac{9}{16}$ inch. The movement of the control arm 58 raises the ribbon $\frac{3}{16}$, $\frac{3}{8}$ or $\frac{9}{16}$ inch to effect printing through the lower part, middle part or upper part of the ribbon respectively.

The control arm 58, driven by the cam follower 24, imparts a lifting motion to the lift arms by pushing upwardly on the left hand lower lift arm 32 at a point between the two arms of the U-shaped cam follower 24. As described hereinbefore, each lower lift arm 32 and the corresponding upper lift arm 34 form opposite sides of a parallelogram, so that when they lift the corresponding ribbon guide 38 which forms a third side of the parallelogram, the ribbon 18 remains vertical without the use of guide posts to restrain the guide 38 from bending under ribbon tension. A compound lever is formed by the control arm 58, the cam follower 24 and the left hand lower lift arm 32. As the cam follower 24 is pivoted about the pivot 50, the arm 58 is raised and, bearing against the left hand lower lift arm 32, pivots both lower lift arms about the axis of the rod 26, thereby raising the opposite end of the lower lift arms and the ribbon guides 38.

A scissors action between the cam follower 24 and the lower lift arm 32 results in a component of force tending to rotate the selector wheel cam follower 60 in a clockwise direction, thereby holding the lug 76 against the cam 72. The spring 54, in addition to holding the cam follower 24 against the cam 22, holds the control arm 58 against the cam follower 24 and the left hand lower lift arm 32 against the control arm.

In the high lift position, the lift arms achieve their greatest acceleration and it is desirable to limit the upward movement. To avoid overtravel of the lift arms at this point, the corresponding upper and lower lift arms, which form opposite sides of parallelograms, are so spaced as to come in contact at the desired upper limit of the high lift stroke as the parallelograms become more distorted and the opposite sides approach a single plane.

While there have been shown and described and pointed out the fundamental novel features of the invention as applied to a preferred embodiment, it will be understood that various omissions and substitutions and changes in the form and details of the device illustrated and in its operation may be made by those skilled in the art without departing from the spirit of the invention. It is the intention therefore, to be limited only as indicated by the following claims.

What is claimed is:

1. A device for moving a ribbon vertically relative to a point of contact between a print element and a platen comprising, in combination, a ribbon guide, a supporting frame spaced horizontally from said ribbon guide, a pair of arms pivotally connected at opposite ends to said supporting frame and said ribbon guide at points spaced vertically equal distances, a lever pivotally supported at one end, means including a cam for swinging said lever about its pivot, an element slidably engaging opposing surfaces on said lever and one of said arms for swinging the latter in response to a swinging of said lever, and means for moving said element to selected points along said lever for varying the swinging of said arms.

2. A printing device comprising, in combination, a platen, a ribbon, at least one print element, operable for printing contact with said platen along a predetermined print line, means movably supporting said ribbon and

operable for interposing said ribbon between said print element and said platen at said print line, said supporting means comprising at least one lower lift arm pivotally mounted at one end and pivotally supporting a ribbon guide at the other end, an upper lift arm corresponding to said lower lift arm, pivotally mounted at one end adjacent said pivotal mounting of said lower lift arm and pivotally joining said ribbon guide at the other end, said four pivot points forming the vertexes of four angles of a parallelogram, means including a lever operable for raising said lower lift arm and consequently said ribbon guide to the extent that said parallelogram is collapsed with opposite sides approaching a common plane and engaging one another with a snubbing action, and means for operating said lever.

3. In a typewriting machine, the combination of a platen, a type element operable for printing engagement therewith, a rotatable eccentric cam, a cam follower pivotally operable by said cam, a frame member, at least one lower lift arm pivotally mounted at one end to said frame member, a ribbon guide pivotally supported at the other end of said lower lift arm, an upper lift arm pivotally mounted in said frame member and said ribbon guide above and parallel to said lower lift arm, said upper and lower lift arm forming two opposite sides of a parallelogram, said frame member and said ribbon guide forming the other two sides, and means operatively engaging said cam follower and said lower lift arm for translating pivotal movement of said cam follower to pivotal movement of said lower lift arm at said pivotal mounting in said frame member thereby lifting said ribbon guide and interposing said ribbon between said type element and said platen.

4. The invention of claim 3 including means selectively operable for shifting the point of engagement of said engaging means whereby the extent of lift of said lower lift arm and said ribbon guide by the pivotal movement of said cam follower is varied.

5. The invention of claim 4 wherein said selectively operable means comprises a rotatable irregular cam, a bell crank having one end adapted to follow the surface of said cam, and a control arm having one end operably connecting said cam follower and said lower lift arm, said control arm being shiftable selectively in accordance with the rotation of said irregular cam.

6. A printing device comprising, in combination, a platen, a ribbon, a print element movable to successive print positions along said platen and operable for printing contact with said platen, means mounting said ribbon for movement with said print element, means movably supporting said ribbon and operable for interposing said ribbon between said print element and said platen at said print line, said supporting means comprising at least one lower lift arm pivotally mounted at one end and pivotally supporting a ribbon guide at the other end, an upper lift arm corresponding to said lower lift arm, pivotally mounted at one end adjacent said pivotal mounting of said lower lift arm and pivotally joining said ribbon guide at the other end, said four pivot points forming the vertexes of four angles of a parallelogram, means including a lever operable for raising said lower lift arm and consequently said ribbon guide to the extent that said parallelogram is collapsed with opposite sides approaching a common plane and engaging one another with a snubbing action, and means for operating said lever.

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