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Decker

[11] **3,866,735**

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[54] **ROTATIONAL POSITIONING MECHANISM FOR SINGLE ELEMENT PRINTER**

[75] Inventor: **Herbert Decker,** Lauf, Germany

[73] Assignee: **Triumph Werke Nurnberg A.G.,** Nurnberg, Germany

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[52] **U.S. Cl.** **197/55,** 197/52

[51] **Int. Cl.** **B41j 1/32**

[58] **Field of Search** 197/16, 18, 52, 55

[56] **References Cited**

UNITED STATES PATENTS

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Primary Examiner—Edgar S. Burr

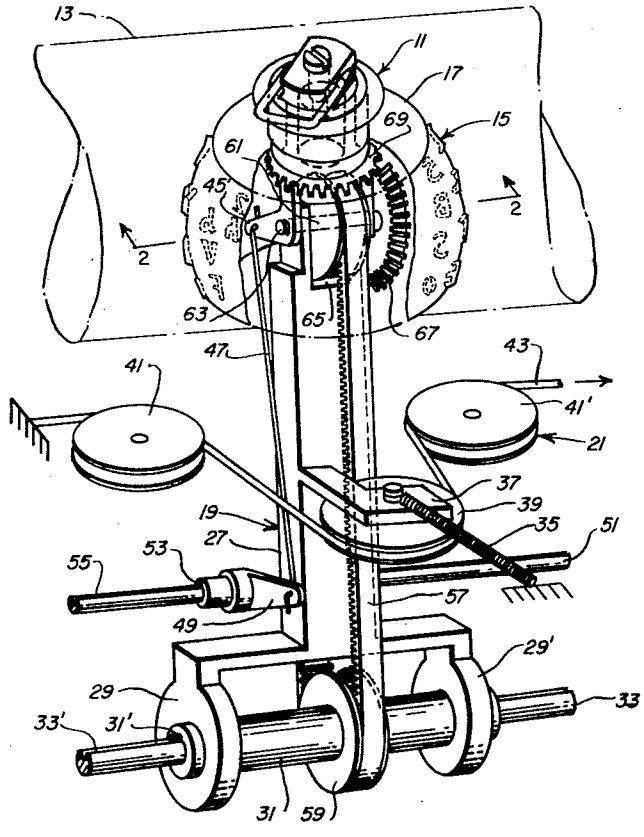
Assistant Examiner—R. T. Rader

Attorney, Agent, or Firm—Joseph R. Spalla

[57] **ABSTRACT**

A plurality of type characters are formed on the periphery of a typehead of a single element printer, and the typehead is rotatably driven to position selected type characters for printing by a belt drive extending into a cavity in the typehead. The typehead is removably secured to a gear rotatably supported on a tilt frame, and the tilt frame is pivotally mounted on a shaft which is rotatably supported in a portion of a supporting frame received in the cavity of the typehead. The shaft carries a beveled gear engaged with the gear associated with the typehead, and the typehead is rotatably driven by an endless toothed belt leading into the cavity of the typehead and trained about a toothed pulley carried on the shaft. The supporting frame is rotatably mounted on a bushing which is slidably carried on a drive shaft, and the toothed belt is trained about a toothed pulley on the bushing so as to enable the typehead to be rotatably driven upon rotational movement of the drive shaft.

4 Claims, 2 Drawing Figures



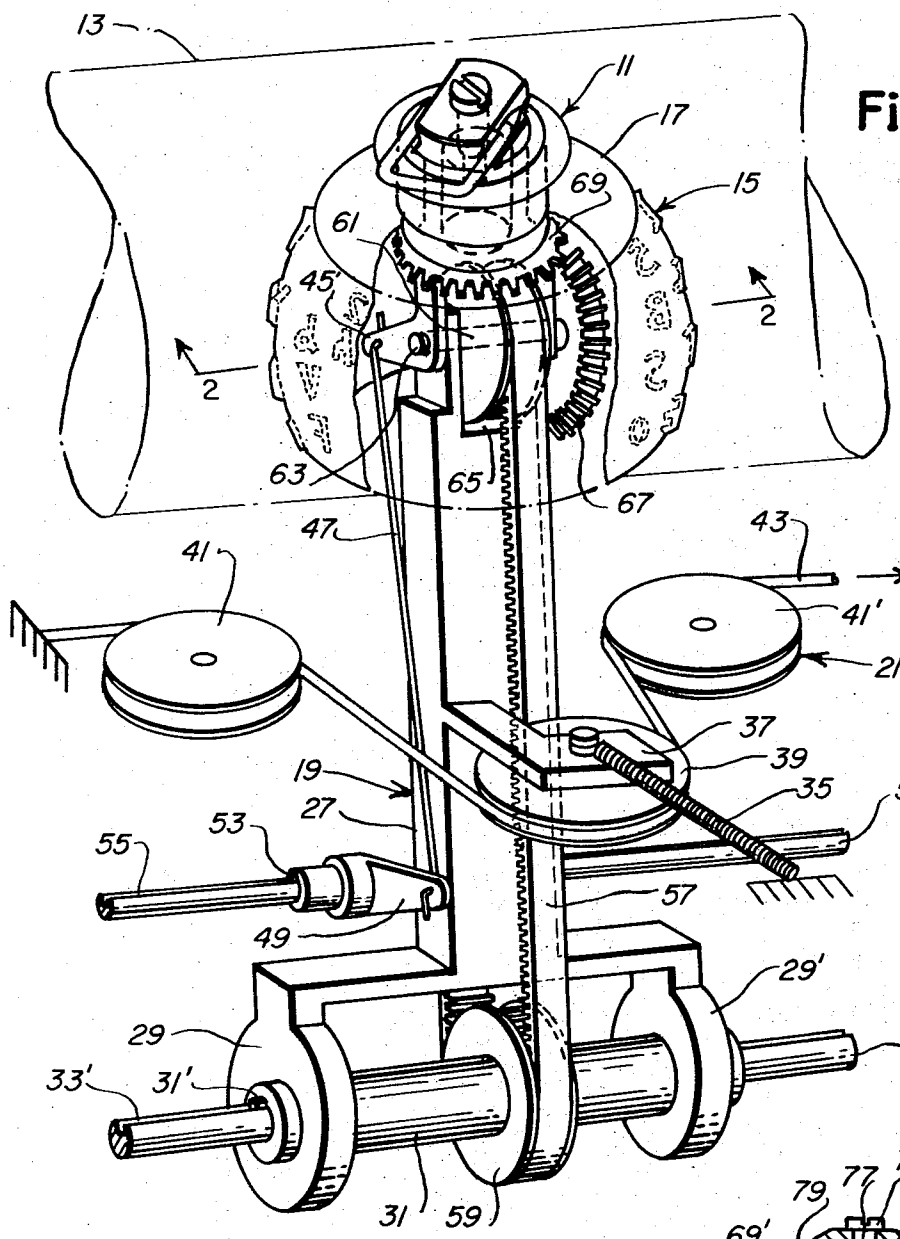

13
11
17
15
69
61
45
2
2
63
65
67
47
43
41
41'
21
37
39
35
51
19
27
53
55
57
49
29'
29
33
33'
31'
31
59

Fig_1

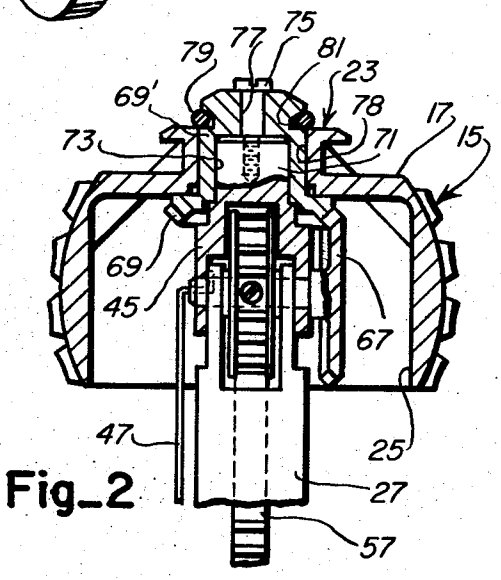

75
77
79
81
23
69'
78
17
15
73
71
69
45
67
47
25
27
57

Fig_2

ROTATIONAL POSITIONING MECHANISM FOR SINGLE ELEMENT PRINTER

This invention relates to a single element printer, and more particularly to a mechanism for positioning a single print element for printing selected type characters.

In a typical single element printer, a plurality of type characters are disposed on the periphery of a generally spherical-shaped type carrier, hereinafter referred to as a typehead, which is supported for movement from a rest position to a print position. Selected type characters are positioned for printing by rotating and tilting the typehead, and printing is effected by moving the typehead to the print position where the selected type character is impacted against a recording medium.

Typically, the movement of the typehead to position a character for printing has involved a complicated drive arrangement. In an attempt to minimize the number of parts necessary to position a selected type character for printing, a spherical typehead has been rotatably driven by an external belt, chain or the like as shown in German Pat. No. 1,561,218 and corresponding U.S. Pat. No. 3,420,350. However, such an arrangement is disadvantageous since the belt is in an area of the typewriter which is accessible to a typist thereby creating a possibility of injury. Moreover, such an arrangement is limited to a spherical typehead, and the tilting movement of the typehead is likely to twist the belt causing excessive wear. Furthermore, the typehead is not easily exchangeable since the replacement of a particular typehead also involves the removal of the drive belt.

Accordingly, an object of the present invention is to provide a single element printer with a belt driven positioning mechanism wherein the belt is arranged so as to be less accessible to a typist, thereby reducing the possibility of injury to a typist.

Another object of the invention is to provide a single element printer with a belt driven positioning mechanism wherein the typehead is easily replaceable without removing the belt drive.

A further object of the invention is to provide a single element printer with a belt driven positioning mechanism wherein the typehead is movable to position a different type character for printing without twisting of the belt drive.

An additional object is to provide a single element printer with a belt driven positioning mechanism which is usable with typeheads having different configurations.

Still other objects, features and advantages of the present invention will become apparent to those skilled in the art from a reading of the following detailed description taken in conjunction with the accompanying drawing, wherein:

FIG. **1** is a partial diagrammatic view of a single element printer having a belt driven positioning mechanism constructed in accordance with the present invention; and

FIG. **2** is a partial sectional view of the single element printer taken along the lines **2—2** in FIG. **1.**

Referring now in detail to the Figures in the drawing, there is shown a single element printer, generally indicated **11,** for printing type characters on a recording medium, not shown, which may be suitably located on a cylindrical platen **13.** The type characters, generally indicated **15,** are formed on the periphery of a spherical or barrel-shaped typehead **17** which is carried by a support means, generally indicated **19,** for movement from a normal rest position to a printing position at the platen **13.** As is conventional, printing is effected by impacting a selected type character **15** against the platen **13,** and the typehead **17** may be driven in a printing movement by a suitable drive means, for example a stepping motor, gear or crank drive, not shown, acting on the support means **19** through a drive arrangement, generally indicated **21.** To enable a line of type to be printed, the support means **19** may be associated with a carriage, not shown, for movement past the platen **13,** or alternatively the platen **13** may be mounted on a carriage for movement past the typehead **17.** The recording medium and the means for moving the typehead **17** past the platen **13** as well as other portions of the printer are not shown since they form no part of the present invention and may be desirably conventional.

As shown, the typehead **17** is generally in the form of an inverted cup supported to rotation about a central top portion **23** and having an internal cavity **25** opening towards the support means **19.** The support means **19** includes an elongated frame **27** with one end received in the cavity **25** of the typehead **17** and the other end terminated in a pair of spaced-apart arms **29, 29'** rotatably supported on a bushing **31** which is slidably carried on a shaft **33.** Although not shown, the support means **19** is associated with a carriage for movement past the platen **13** and is normally urged to a rest position by a spring **35** stretched between a suitable portion of the carriage and an arm **37** extending laterally from the elongated frame **27.** The drive arrangement **21** includes a sheave **39** rotatably carried on the laterally projecting arm **37** and a pair of sheaves **41, 41'** rotatably supported on the carriage at a forward location, and the typehead **17** is moved forwardly to the printing position by pulling on the end of a suitable rope or cable **43** which is trained around the sheaves **41', 39** and **41** with the other end suitably secured to the carriage.

As is conventional, the type characters **15** are disposed on the periphery of the typehead **18** in circumferential rows and columns, and selected type characters **15** are printed by rotating and tilting the typehead **17** to position desired type characters **15** for impacting against the recording medium upon a printing movement of the support means **19** as described above. To enable the typehead **17** to be tilted for positioning type characters **15** in the different circumferential rows for printing, the typehead **17** is supported in a manner explained below on a tilt frame **45** which forms a portion of the support means **19** and is pivotally connected to the end of the elongated frame **27** received in the cavity **25** of the typehead **17.** As shown, the tilt frame **45** has an arm **45'** which is connected by a link **47** to a crank arm **49** which is slidably supported on a tilt shaft **51** for movement with the carriage. The crank arm **49** is rotatably connected to the tilt shaft **51** by means of a key **53** received in a slot **55** formed in the tilt shaft **51,** and the tilt shaft **51** may be driven by a suitable stepping motor, gear or crank drive, not shown, so as to impart a tilting movement to the typehead **17.**

In accordance with the present invention, the rotational movement of the typehead to position a selected type character **15** for printing is effected by drive means including a toothed belt **57** extending into the

cavity **25** of the typehead **17.** As shown, the toothed belt **57** is trained about a toothed pulley **59** carried on the bushing **31** between the arms **29, 29'** of the elongated frame **27** and about another toothed pulley **61** carried on a shaft **63** which is rotatably supported at the other end of the elongated frame **27** which has a slot **65** for receiving the toothed pulley **61.** The shaft **63** also serves as the pivotal support for the tilt frame **45** and carries a beveled gear **67** driving another gear **69** associated with the typehead **17.** As shown, the gear **69** is rotatably mounted on the tilt frame **45** with a cylindrical projection **71** received thereof in a cylindrical bore **73** formed in an upwardly projecting hub portion **69'** of the gear **69,** and with a shoulder of a screw **75** received through an axial bore **77** in the gear **69** and threaded into the cylindrical projection **71** of the tilt frame **45.** To enable the typehead **17** to be removably secured to the gear **69,** an opening **78** is formed in the central top portion **23** for receiving the upwardly projecting hub portion **69'**, and the typehead **17** may be locked to the gear **69** by a spring clip **79** received in an annular groove **81** in the projecting hub portion **69** adjacent the central top portion of the typehead **17.**

In operation, the typehead **17** may be rotated to position a selected type character **15** for printing by rotatably driving the shaft **33** which is rotatably secured to the bushing **31** by a key **31'** slidable in a groove **33'** formed in the shaft **33,** and the shaft **33** may be rotatably driven by a suitable stepping motor, crank or gear drive. As the bushing **31** is rotatably driven, the toothed belt drive **57, 59, 61** rotates the shaft **63** to drive the beveled gear **67** which in turn rotatably drives the gear **69** associated with the typehead **17.** In addition, a tilting movement of the typehead **17** to position different circumferential rows of type characters **15** for printing may be effected by rotating the shaft **55** to pivot the tilt frame **45.** As described above, the tilt frame **45** is pivotally supported about the shaft **63** and the tilting movement of the typehead **17** may be accomplished without twisting the toothed belt **57.**

What is claimed is:

1. In a printing machine having a hollow downwardly open cup-shaped typehead on which a plurality of type characters are located in columns and rows on its outer periphery, said typehead being adapted to be rotatably positioned about a rotate axis to select a column of type characters and to be tiltably positioned about a tilt axis to select a row of type characters, comprising,

support means extending into the hollow interior of said typehead for supporting said typehead for movement about an external axis to effect printing of a type character at a selected row and column location,

a first shaft defining said external axis,

a second shaft parallel to said first shaft rotatably supported on the portion of said support means within said typehead, said second shaft defining said tilt axis,

a tilt frame pivotally supported on said second shaft,

a first gear rotatably supported on said tilt frame and having its axis along said rotate axis,

means securing said typehead to said first gear,

a second gear secured to said second shaft meshing with said first gear,

a first pulley rotatably mounted on said first shaft,

a second pulley secured on said second shaft,

drive means comprising a belt trained around said first and second pulleys to rotatably position said typehead about its rotate axis,

and means for rocking said tilt frame about said second shaft to select a row of type characters without twisting movement of said belt.

2. In a printing machine as recited in claim **1** said typehead having an upwardly extending central sleeve, said first gear having a hollow shaft extending through said sleeve, and said tilt frame having a cylindrical projection extending into said hollow gear shaft.

3. In a printing machine as recited in claim **1,** wherein said rotate and tilt axis intersect.

4. In a printing machine as recited in claim **1,** said typehead being barrel-shaped.

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