# United States Patent [19]

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[54] **APPARATUS FOR TRANSPORTING A TYPE SUPPORT CARRIAGE IN TYPEWRITERS OR SIMILAR OFFICE MACHINES**


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[51] **Int. Cl.** ..... **B41j 19/00**

[58] **Field of Search** ..... 197/82, 84, 84 A, 197/84 B, 86, 68, 85



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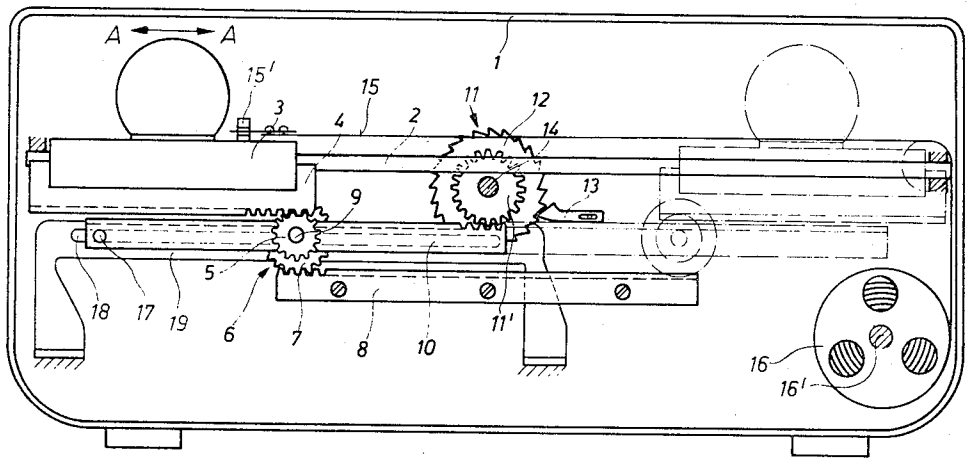
[57] **ABSTRACT**

A device for transporting a type support carriage in typewriters or similar office machines including a stepping mechanism which advances the support carriage in steps in the typing direction. The stepping mechanism includes a first toothed rail mounted on the machine frame and displaceable relative thereto. A second toothed rail is provided which is also fastened to the machine frame along with a third toothed rail which is fastened to the support carriage. A sprocket wheel assembly is also provided with the first toothed rail engageable through the sprocket assembly with the third toothed rail in a path translating manner while the sprocket assembly is in engagement with the second toothed rail.


**6 Claims, 3 Drawing Figures**



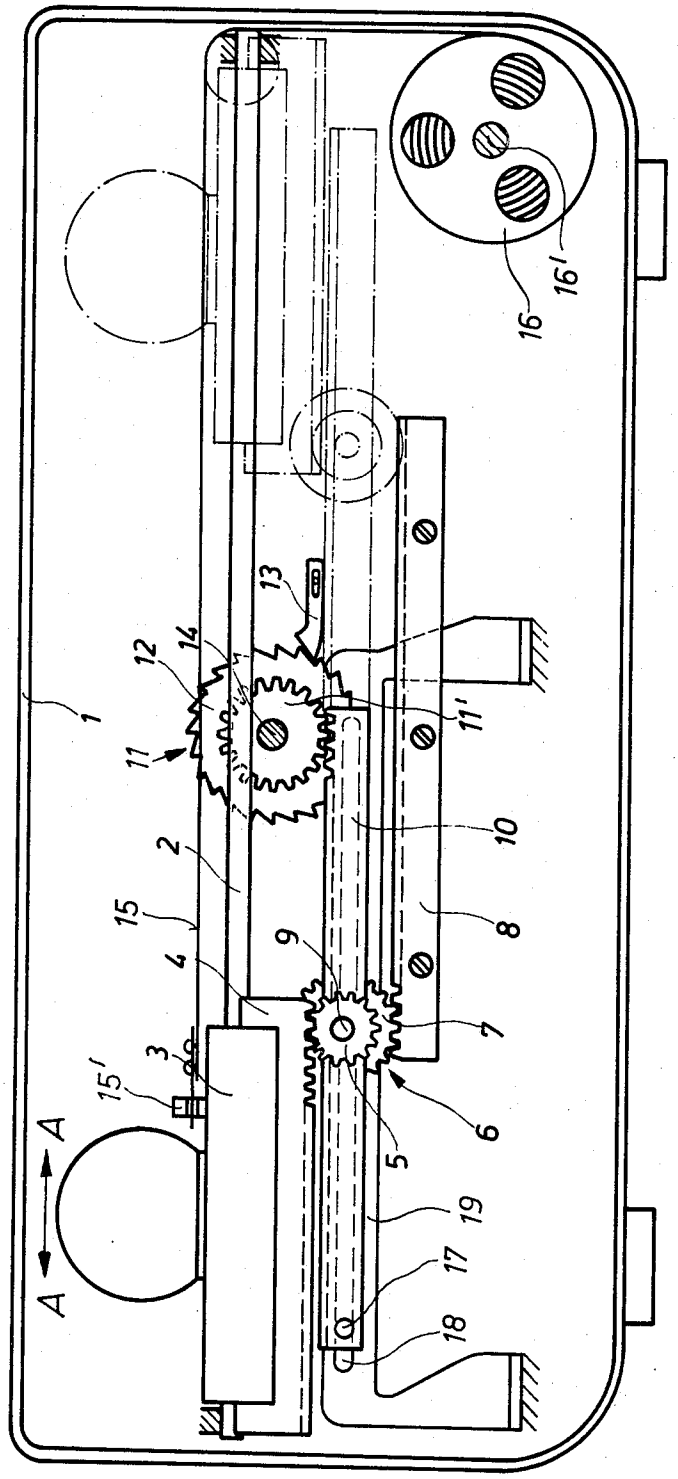



FIG.1

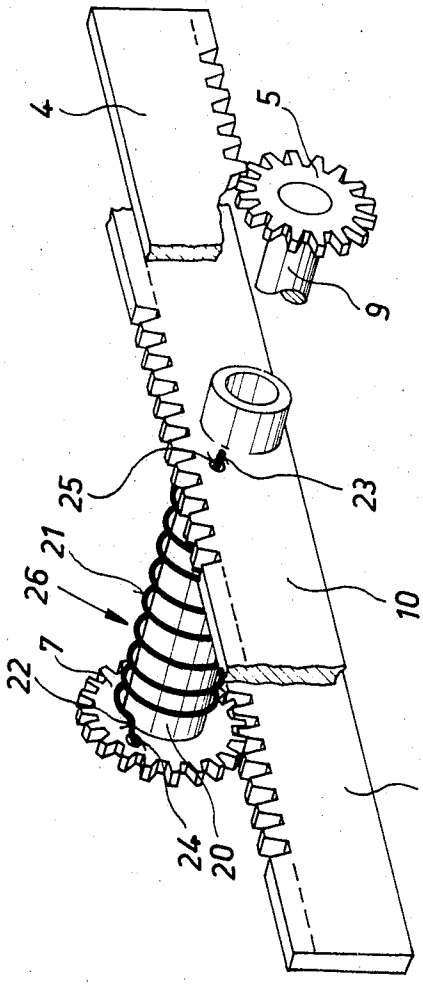
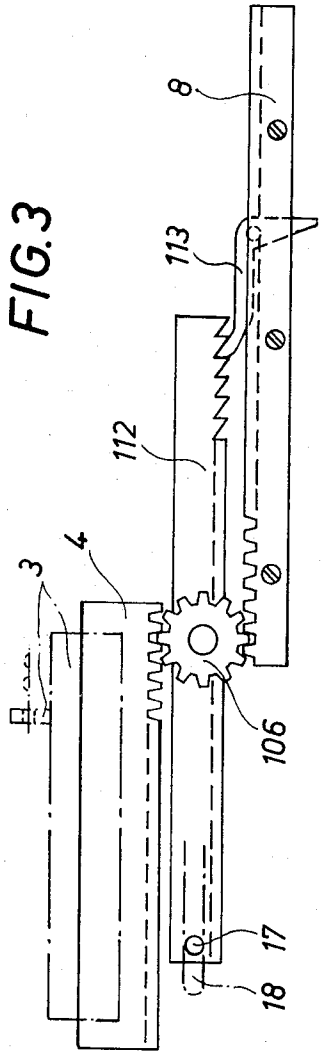



FIG. 2

FIG. 3



# APPARATUS FOR TRANSPORTING A TYPE SUPPORT CARRIAGE IN TYPEWRITERS OR SIMILAR OFFICE MACHINES

## BACKGROUND OF THE INVENTION

The present invention relates to typewriters and similar office machines, and more particularly to a device for transporting a type support carriage in which the carriage is advanced in steps in the typing direction by a stepping mechanism fastened to the machine frame.

Different transporting devices are known which have the purpose of providing for the type support carriages a transporting device equivalent to the toothed rail drives of generally known paper carriage drives in which the toothed rails move laterally out of the machine housing together with the carriage.

Thus, a device is known, for example, in which the step advancing mechanism is located in the movable portion or type support carriage of the typewriter or similar office machine, with the advancing mechanism cooperating with a toothed stepping rail fastened to the typewriter frame. This device requires, however, that the means for actuating the stepping latch of the advancing mechanism to initiate the step advances, for actuating the rail for the stepping latch for tabulation purposes, and for actuating the silent return of the carriage, be provided in the form of rockers or rotating rods which extend at least over the entire area over which the carriage can move. This results in a relatively expensive and complicated structure since these rockers must be very stable and precise in order to be able to operate dependably over the entire area of movement of the carriage. Also, these elements have a considerable mass which significantly limits the actuation speed of the step advancing mechanism.

To overcome the drawbacks of the above-described devices, attempts were made to have the type support carriage of office machines, which operate at high speeds, move in the typing direction as well as in the carriage return direction by means of a threaded spindle. Here the step advancing mechanism can again be mounted to the machine frame.

These devices have proven to be satisfactory in office machines operating at high speeds, but they exhibit the drawback that the threaded spindles are also very expensive to manufacture and must be fabricated with extreme precision. A further drawback is that the step advancing mechanism, the carriage return device, and the tabulating device must be located on one side of the typewriter, i.e., at one end of the helical shaft, with the result that the machine becomes unnecessarily large in a lateral direction.

## SUMMARY OF THE INVENTION

It is, therefore, a general object of the present invention to provide a device for transporting a type support carriage which overcomes the drawbacks of the known devices.

It is a more specific object of the present invention to provide a device for transporting a type support carriage for typewriters and similar office machines in which a set of toothed rails cooperate with a step advancing mechanism and a sprocket wheel assembly to advance the type support carriage in steps in the typing direction.

These and other objects are accomplished by the improvement of the present invention which is composed



of a step advancing mechanism mounted on the machine housing and disposed in the center thereof. The device operates according to the toothed rail drive principle, which has long been known in typewriters with paper carriages where it has proven to be extremely satisfactory. The improvement includes the provision of a first, second and third toothed rail along with a sprocket wheel assembly. The first toothed rail is formed as part of the step advancing mechanism and is mounted on the machine frame for displacement relative thereto. The second toothed rail is fastened to the machine frame, while the third toothed rail is fastened to the support carriage. The first toothed rail engages through the sprocket wheel assembly with the third toothed rail in a path translating manner, while the sprocket wheel assembly is in engagement with the second toothed rail.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front elevation view of a type support carriage provided with one embodiment of the present invention.

FIG. 2 is a perspective view partly in section illustrating a portion of the device of FIG. 1.

FIG. 3 is a simplified view of an alternate embodiment of the present invention.

## DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 1 schematically illustrates a typewriter frame 1 on which a guide rail 2 is fastened. On the guide rail 2, a type support carriage 3 is mounted for longitudinal displacement as indicated by the arrow A. The type support carriage 3 is provided with a third toothed rail 4 which preferably approximately corresponds in length to the length of the carriage 3. A sprocket wheel 5, which forms a component element of a sprocket wheel assembly 6, engages in the toothed rail 4. The sprocket wheel assembly 6 also includes a shaft 9 and a second sprocket wheel 7 which meshes with a second toothed rail 8 which in turn is fastened to a portion of the typewriter housing. The shaft 9 serves to mount the sprocket wheel assembly 6 to a first toothed rail 10 so that the assembly is freely rotatable therein.

A step advancing mechanism 11 is provided. The mechanism 11 is mounted on a shaft 14 to be rotatable relative to the typewriter frame 1. The mechanism 11 includes a sprocket wheel 11' and a stepping wheel or ratchet 12 along with a generally known stepping latch or pawl 13. The toothed rail 10 is mounted in the typewriter frame 1 by a guide sheet 19 to be longitudinally displaceable therein. In addition to partly supporting the sprocket wheel assembly 6, the toothed rail 10 also engages, via its teeth, with the sprocket wheel 11' of the step advancing mechanism 11.

The type support carriage 3 is shown on the left side of FIG. 1 in its wound position, i.e., at the beginning of a typing line. If now the step advancing mechanism 11 is released by the stepping latch or pawl 13 to initiate advancement of the carriage 3 in steps, the carriage will move to the right under the influence of a generally known carriage moving device, e.g., via a tension cord 15 connected at one end to the carriage 3 by a pin 15' and at the other end to a spring motor 16 which in turn is rotatably mounted by a shaft 16' to a portion of the typewriter housing. Thus, the stepwise movement effected, in a well-known manner, by the release of the

stepping latch 13 is transferred via the sprocket wheel 11' to the toothed rail 10 and ultimately the carriage 3. That is, release of the pawl 3 permits the rail 10 and, through its connection to the rail 4, the carriage 3 to move toward the right in a stepwise fashion. During this movement, the sprocket wheel 7 rolls along the toothed rail 8 in a clockwise direction (FIG. 1), so that the type support carriage 3 is advanced as a result of the meshing of the sprocket wheel 5 with the rail 4. The path traversed by the type support carriage 3 during the stepwise advancement consists of two path portions. The first portion of the path is that initiated by the step advancing mechanism 11 for the toothed rail 10, which in turn transfers the stepwise movement to the carriage 3; and the second portion of the path is that resulting from the angular path traversed by the sprocket wheel 5 produced by the sprocket wheel 7 rolling along the toothed rail 8 as the rail 10 proceeds toward the right. Thus, the type support carriage 3 always traverses a longer path than the toothed rail 10. The type support carriage 3 thus performs a relative movement with respect to the toothed rail 10.

The device according to the present invention is designed to be operated in such a manner that the toothed rail 4 of the type support carriage 3 is traversed once by the sprocket wheel 5, while the toothed rail 10 is traversed once by the sprocket wheel 11, and the toothed rail 8 is traversed once by the sprocket wheel 7 over their total lengths when the type support carriage 3 moves from the left position (shown in solid lines) to the right position (shown in dot-dash lines), (FIG. 1). Consequently, the length of the toothed rail 4 corresponds to the second portion of the path traversed by the carriage 3 and produced by the angular path traversed by the sprocket wheel 5 and the length of the toothed rails 8 and 10 correspond to the first portion of the path initiated by the step advancing mechanism 11.

With the arrangement according to this embodiment of the present invention, a toothed rail transporting device for a type support carriage is provided which assures that the toothed rail — when the step advancing mechanism is mounted to the typewriter frame — does not extend beyond the sides of the typewriter frame.

It is of course possible to construct the device according to the present invention in such a manner that the toothed rail 10 is designed to be a toothed advancing rod 112 which engages directly with a stepping latch or pawl 113. Also, the sprocket wheel assembly 6 may consist of only one sprocket wheel 106 which then meshes with the toothed rail 4 and the toothed rail 8 (FIG. 3). These, however, would only be structural changes which do not change the general scope of the present invention.

In order to always assure safe engagement of the toothed rail 10 with the sprocket wheel 11, the rail 10 is provided at preferably the left end thereof with a bolt 17 which always extends into a groove 18 formed in the guide sheet 19 which in turn is fastened to a portion of the typewriter housing. It is seen that the guide sheet or guide member 19 is coextensive with the rail 10. The groove 18 is of a generally elongated shape so that the toothed rail 10 is guided, via its bolt 17, over its entire range of movement.

In a preferred embodiment, the device of the present invention is provided with a spring motor 26 which is designed to be particularly inexpensive and space-saving (FIG. 2). The spring motor 26 is preferably formed as part of the sprocket wheel assembly. The sprocket wheel 7 is mounted on a shaft 20 which is mounted at the end away from the mounted sprocket wheel 7 in the rail 10 and forms a bearing seat for the sprocket wheels 5 and 7, the former wheel being mounted on a shaft 9 which in turn is received within the shaft 20 in one preferred embodiment. On the shaft 20 a torsion spring 21 is loosely attached between the wheel 7 and the rail 10. The free ends 22 and 23 of the spring 21 engage in bores 24 and 25, disposed in the toothed wheel 7 and toothed rail 10, respectively. With this skillful arrangement it is possible for the sprocket wheel assembly 6 together with the toothed rail 10 to form part of the spring motor 26 for movement of the carriage 3.

As a result of the present invention, it is now possible to make the toothed rail for the type support carriage substantially shorter than would heretofore have been necessary to achieve the total range of movement for a typed line. This result is accomplished because the toothed rail 4 also moves relative to the toothed rail 10, in the same direction as, and at a greater speed than, rail 10.

It will be understood that the above description of the present invention is susceptible to various modifications, changes and adaptations, and the same are intended to be comprehended within the meaning and range of equivalents of the appended claims.

I claim:

1. In a device for transporting a type support carriage in typewriters or similar office machines in which the type support carriage is advanced in steps in the typing direction by a step advancing mechanism fastened to the machine frame, the improvement comprising: a first toothed rail formed as part of said step advancing mechanism and mounted on the machine frame for displacement relative thereto; a second toothed rail fastened to said machine frame; a third toothed rail fastened to the type support carriage; and a sprocket wheel means freely rotatably secured to said first toothed rail for displacement therewith as a unit, said sprocket wheel means meshing with the teeth of said second and third toothed rails.

2. A device as defined in claim 1, further comprising a guide member mounted on the machine frame coextensive with said first toothed rail, means defining a groove in said guide member and a bolt provided on said first toothed rail, said bolt being in continuous engagement with said groove.

3. A device as defined in claim 1, further comprising a spring motor formed by the sprocket wheel means, the first toothed rail, and a torsion spring, and wherein the sprocket wheel means includes a bearing seat upon which the torsion spring is disposed with the free ends of said spring engaging in bores provided in a sprocket wheel of the sprocket wheel means and in the first toothed rail, respectively.

4. A device as defined in claim 1, wherein the step advancing mechanism includes a toothed stepping rail which supports the sprocket wheel means and a stepping latch which directly engages the teeth of said toothed stepping rail, said toothed stepping rail constituting said first toothed rail.

5. A device as defined in claim 1, wherein said third toothed rail is displaceable relative to said first toothed rail by said sprocket wheel means, and wherein the displacement of said third toothed rail is greater than the displacement of said first toothed rail.

6. A device as defined in claim 1, wherein said third toothed rail is substantially shorter than the length of the travelling path of said type support carriage.

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