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Sobottka et al.

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[54] **TYPE CARRIER SETTING DEVICE**

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[30] **Foreign Application Priority Data**

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[51] **Int. Cl.** **B41j 1/54**

[58] **Field of Search** ..... 101/95, 93 C, 93 R, 101/99, 110, 91, 96, 7, 375; 235/144

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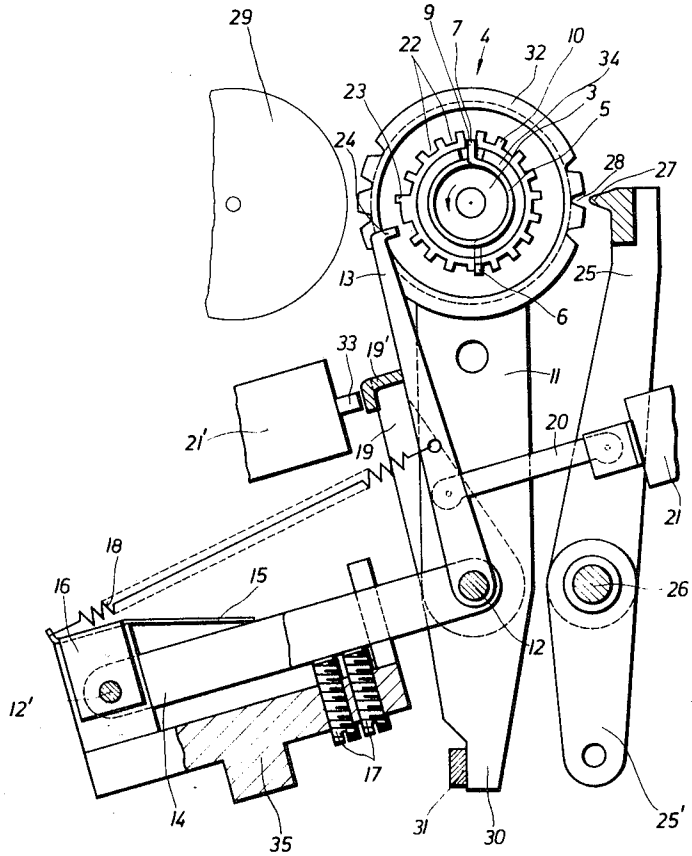
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[57] **ABSTRACT**

A setting device for type carriers having a plurality of characters in printers having a shaft and a loop spring for each type carrier arranged about the shaft. Each type carrier is mounted on a respective loop spring so that the type carrier can be moved into and arrested in a position for printing a desired character. An adjustable detent mechanism is provided which is magnetically actuated by a synchronization device to set each type carrier. A printing ledge moves the set carriers against a platen to print.

10 Claims, 4 Drawing Figures

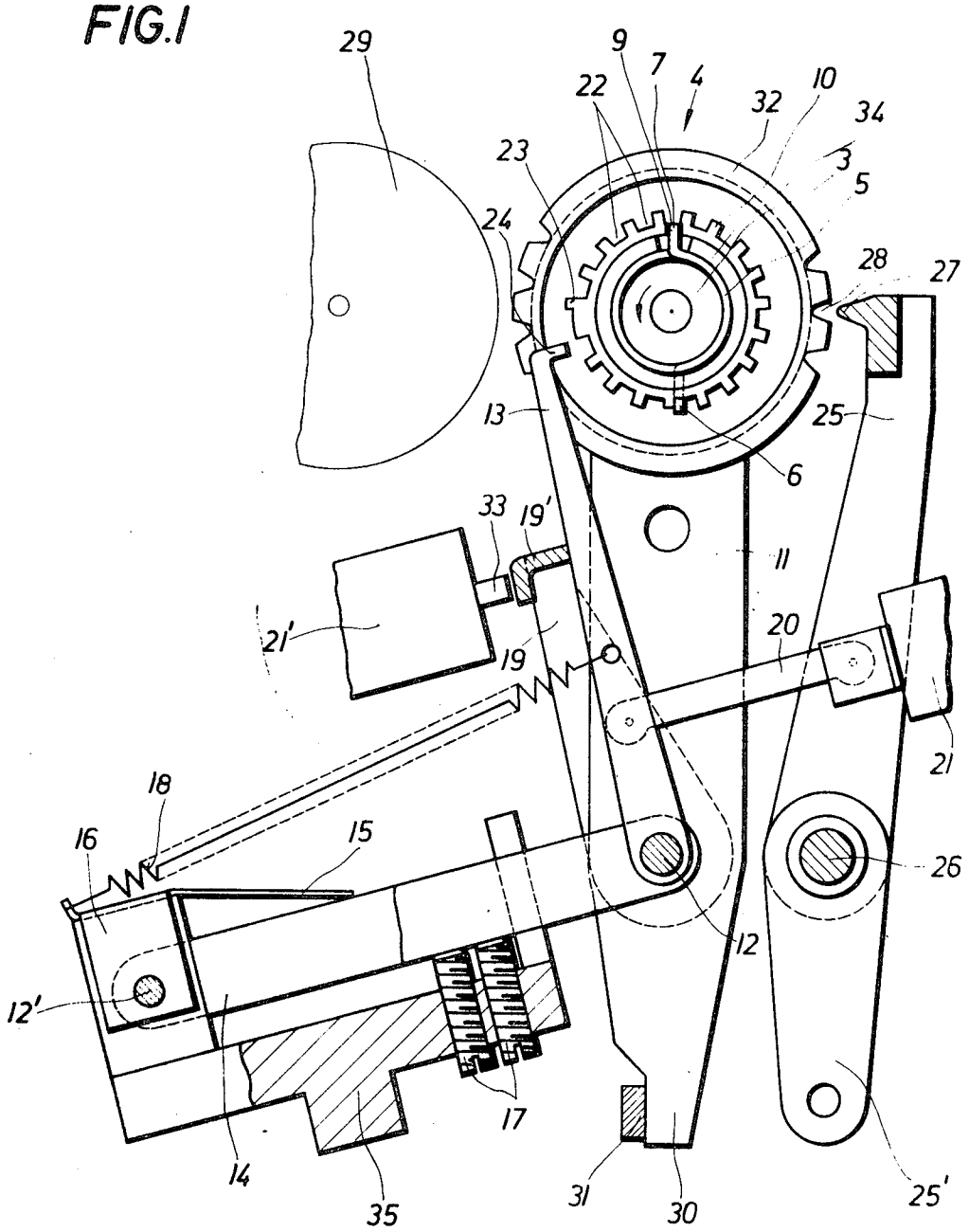


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SHEET 1 OF 2

FIG. 1



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FIG. 2

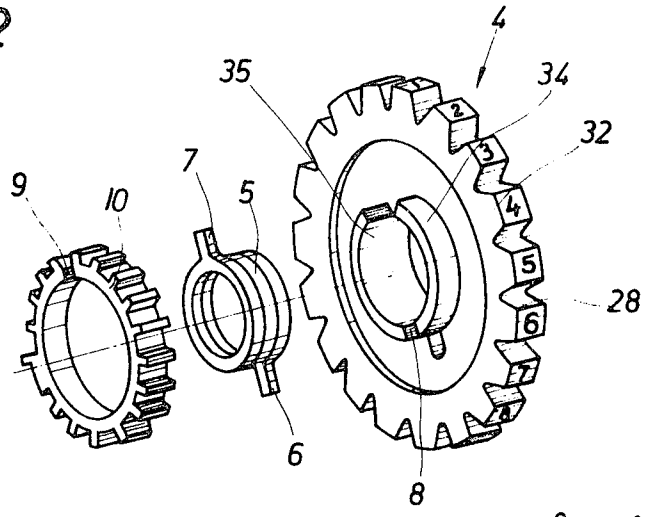


FIG. 4

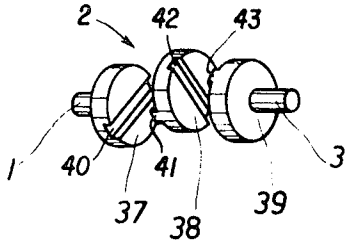
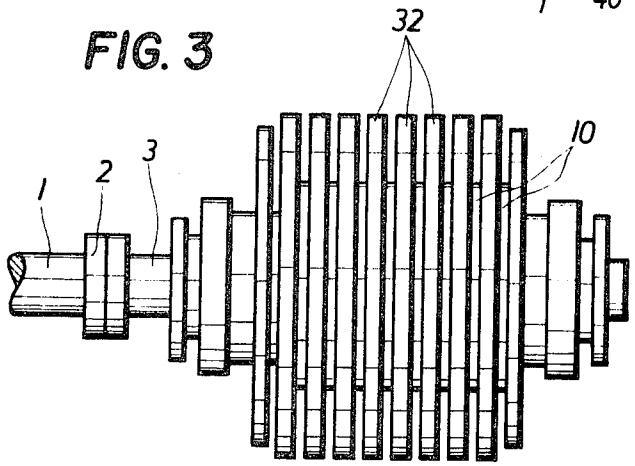


FIG. 3



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TYPE CARRIER SETTING DEVICE

BACKGROUND OF THE INVENTION

The present invention relates to a setting device for type carriers in printers for data processing machines; particularly parallel printing typewriters, calculators and similar office machines having at least one type carrier arranged so that it can be coupled with a driven shaft by means of a loop spring, and so that it can be rotated and held in an angular position corresponding to the desired character to be printed.

The total output of modern data processing systems is often reduced when printout is desired. It is thus necessary to provide printers with high operating speeds. Such printers present the problem of individually setting the type carriers and then print-them either individually with a single hammer blow or as a line of type composed of a plurality of type carriers. It is important in this regard that the type carriers be set with as little delay as possible.

In the known devices the type wheels are set by means of intermediate gears which are disposed on a separate switching or drive shaft. The type wheels are provided with teeth for engagement with corresponding teeth in the intermediate gears; the intermediate gears being taken along by the drive shaft via torque-limiting clutches and being adjustable by means of blocking latches.

This known arrangement makes it possible to retain the small spacing of the type wheels desired for modern printers, but it still requires a relatively large structure and has not been found satisfactory. It is necessary, particularly for high switching speeds and switching accuracies, that the portions to be blocked comprise as small a mass as possible. This also has a considerable effect on the noise development. On the other hand, it has also been proposed to accomplish the setting of a single sum-type carrier of a typewriter by means of a loop spring clutch. Such an arrangement, however, also has a relatively large structural width, which is not suited for type carriers which are arranged in very close proximity.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a setting device for type carriers in printers which consists of very simple elements and permits a compact structural configuration.

Another object is to provide a mechanism wherein the switching speed and accuracy is increased, and the noise development is held within acceptable limits.

These objects and others are accomplished according to the present invention by disposing the type carriers directly on the loop springs. The loop springs are preferably disposed within the dimensions of the type carriers. A further feature is that the type carriers are connected to the loop springs and are disposed on the driven shaft so that there is practically no play in their lateral spacing; the loop springs are configured so that they are switchable and able to be coupled with the driven shaft through stop discs. The frictional force between an open loop spring and the driven shaft is very slight after the associated type disc has been stopped, so that energy losses caused by friction are negligibly small.

The setting device meeting the above requirements is characterized by a still further advantageous feature in which the stop discs are rotatably mounted on the type carriers and preferably are constructed from lightweight material. Thus, in contradistinction to the known arrangement where the intermediate gears and the type wheels must be braked, the machine becomes relatively noiseless, since the suddenly stopped stop discs exhibit little inertia and the larger type discs can be braked relatively softly. With type wheels and setting elements having small masses, the entire energy requirement for the printing process can also be kept very low.

Yet another advantageous feature of the present invention is that spring restrained detents are mounted on setting elements and can be individually adjusted. This permits wide production tolerances for the setting elements and accurate alignment in the proper line of the types on type carriers of parallel printers.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an elevational view, partly in cross section, of a setting device according to the present invention.

FIG. 2 is an exploded perspective view of a type carrier assembly.

FIG. 3 is an elevational view of an assembly of type carriers.

FIG. 4 is an exploded perspective view of a clutch.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 1 shows a type carrier setting device having a plurality of type wheels **32** mounted on a driven shaft **3.** Since FIG. **1** is a side elevation view, only one of the type wheels **32** is visible. Each type wheel **32** has a plurality of characters and defines a plurality of peripheral recesses **28** and is provided with a respective loop spring **5** for coupling the type wheels **32** to shaft **3.** A stop disc **10** which defines a plurality of peripheral recesses **22** and is mounted on a hub portion **34** of each type wheel **32.** The characters may, for example, be raised mirror-reversed characters. Each loop spring **5** has a pair of outer ends **6** and **7**; the outer end **6** engaging in a slot **8** in hub **34** and outer end **7** engaging in a slot **9** in stop disc **10.** The stop disc **10** is preferably constructed from a lightweight material. The assembly of the type wheels **32,** loop spring **5** and stop disc **10** can be readily seen from the exploded perspective view shown in FIG. **2.** FIG. **3** shows a plurality of the assemblies of type wheels **32,** loop springs **5** and stop disc **10** together on shaft **3.**

Driven shaft **3** is mounted on a type wheel carrier **11,** which is pivotally mounted on a shaft **12.** Detent latches **13,** one for each type carrier assembly, also are rotatably mounted on shaft **12** and are arranged axially to cooperate with the stop disc **10.**

A setting crank **14** is provided for each detent latch and, in addition, provides the support for the shaft **12.** A leaf spring comb **16** having resilient leaves **15** biases each crank **14** against respective adjustment screws **17.** In order to be able to accommodate the screws **17** in the space available they are arranged in an offset manner, as can be seen in FIG. **1.** The ends of cranks **14** opposite the ends mounting shaft **12** are mounted on a shaft **12'**, which is attached to a suitable mounting member **35.** Member **35** is in turn mounted to the machine frame (not shown).

A universal rocker arm **19** is also rotatably mounted on shaft **12** and has a rail **19'** which is common to all

of the detent latches 13. A plurality of springs 18, which may be helical tension springs, are fastened between a respective detent latch 13 and the leaf spring comb 16. These springs 18 bias all of the detent latches 13 against the rail 19'. Detent latches 13 are also provided with detents 24 which are arranged to fall into the recesses 22 in the respective stop disc 10 and to coact with the abutment tongues 23 of each stop disc 10.

A plurality of push rods 20 are provided to connect each detent latch 13 to a respective actuating magnet 21. Magnets 21 may be of any suitable well known type, such as a solenoid. The magnets 21 are actuated by a synchronization device having subsequently connected amplifiers.

The position of rail 19' can be adjusted by the plunger 33 of a magnet device 21', which may also be a solenoid.

It is to be understood that although only one of those elements such as latches 13 and cranks 14 which have been indicated as being provided in a number equal to the number of type carrier assemblies, only one of each is seen in FIG. 1 since it is a side elevation view. The exact number of type carrier assemblies used is, of course, a matter of choice.

A printing ledge carrier 25, which is pivotally mounted on a shaft 26, has a printing ledge 27 which is arranged to engage into recesses 28 of the type wheels 32. A platen 29 is positioned on the side of the type wheels 32 diametrically opposite from ledge 27. An abutment 31 is rigidly attached to the machine frame and provides a stop for the tongue 30 of the carrier 11. When tongue 30 is abutting abutment 31, the carrier 11 is in its rest position (FIG. 1).

Lever 25 can be pivoted about shaft 26 by applying a force to portion 25'. To prevent the printing ledge 27 from swinging into type wheels 32 while they are rotating, a disc (not shown) with a notch on its circumference is mounted on shaft 3 so that printing ledge 27 can only swing out when it is opposite the notch.

As can be seen in FIG. 3, the driven shaft 3 is connected with a drive shaft 1 by means of a known, axially movable clutch 2, which can be moved toward the platen with shaft 3 during the printing process. The clutch 2 illustrated as an exploded perspective view in FIG. 4 is an equalizing clutch known generally as an Oldham clutch. An interposer 38 connects an the actuator 37 on the drive shaft 1 with an actuator 39 on the driven shift 3. The lug-notch-connections 41, 40 and 43, 42 make it possible for the type wheel carrier 11 with the driven shaft 3 to be moved toward the platen 29. The drive shaft 1 has a fixed fulcrum (not shown), and cannot be moved toward the platen. The single revolution clutch (not shown) that drives shaft 1 is fully described in patent application Ser. No. 863,165 filed Oct. 2, 1967. Furthermore, the synchronization device utilized is of a type with only obvious modification, as that described in patent application Ser. No. 874,602 filed Nov. 6, 1969.

The type wheels and the stop disc are preferably made of a suitable resistant synthetic resins of the acetol plastic group, more particularly a synthetic - resin such as is sold by "Du Pont" under the Trademark " Delrin "

The present invention is not limited to the described embodiments; rather, it can be modified by appropriate changes in the individual features.

For example, to further increase the speed of the printing process the zero setting of all the types can be made superflous by the association of a synchronizing device (not shown) with each type disc.

The device of the present invention can be possibly used for providing a visual readout. For this purpose, it is only necessary to exchange the type wheels having the raised mirror-reversed characters with wheels having inlaid, preferably colored, characters.

Operation of Mechanism:

The known single revolution clutch rotates the drive shaft 1 and, thus, through clutch 2, the driven shaft 3, in such a manner that shaft 3 makes two full revolutions during one printing process. Between the two revolutions, there is a rest period for the actual printing act.

The type wheels 32 are so adjusted that when the printer is in its rest position, the same characters come to lie in a common plane. Since the type wheels 32 in their unblocked state are coupled with the driven shaft 3 through the loop springs 5, they are taken along without slip until the synchronization device, with its subsequently connected amplifier device, causes the magnets 21 to be actuated as a function of the character given, for example, by the calculator for each location, and the detents 24 of the detent latches 13 are caused to engage, by means of push rods 20, into appropriate recesses 22 in stop disc 10. Thus, the stop discs 10 are arrested and the force of the mass of the type wheels 32 causes the loop springs 5 to be expanded by the end 7 being carried along in recess 9 of stop disc 10. This interrupts the drive and brakes the type wheels 32 to stop them.

The braking of the type wheels 32 is supported by the braking effect of the outer circumference of the loop spring 5 on the surface 35 of the bore of type wheels 32.

After completion of the first revolution of the driving shaft 1 and the driven shaft 3, all the characters intended to be printed are set at the level of a plane between the center of shaft 3 and the center of platen 29.

While shafts 1 and 3 are stopped, the printing ledge lever 25 is pivoted counterclockwise (FIG. 1) about axis 26 so that the printing ledge 27 is brought into engagement with a wedge-shaped recess 28 of the type wheels 32.

Thus, the individual type wheels 32 are so aligned that a uniform line level is assured for the selected types, and the counterclockwise movement of the lever 25 continues until the selected types engage the platen and are printed. Upon the return of lever 25 to its rest position (FIG. 1), the universal rocker 19, is pivoted clockwise by the plunger 33 and brings all of the detents 24 of the detent latches 13 into the rotational range of the abutment tongues 23 of stop disc 10. Then the second revolution of the drive shaft 1 and the driven shaft 3 takes place. This causes the type wheels 32 to rotate until their abutment tongues 23 engage detents 24. The effect of this is to bring all of the type wheels 32 back into their zero position. In addition, the loop springs 5 once again couple the type wheels 32 to the driven shaft 3 so that a new printing process can be initiated. After the second revolution ends, rocker 19 is pivoted counterclockwise and the printing cycle is ready to begin again.

It will be understood that the above description of the present invention is susceptible to various modifications, changes and adaptations, and the same are in-

tended to be comprehended within the meaning and range of equivalents of the appended claims.

We claim:

1. For use in printers having a shaft driven in a selected direction and a platen, a type setting device comprising, in combination:

a. a type carrier mounted on said shaft for rotation relative thereto and carrying a plurality of characters;

b. arresting means comprising a plurality of elements and operatively associated with said carrier for arresting said carrier in an angular position which corresponds to the selected character to be printed, means mounting a first element of said arresting means to normally rotate with said shaft, said mounting means permitting rotary movement of said first element through a small angle relative to said carrier, a second element for halting said first element from rotation with said shaft in any one of a plurality of angular positions each corresponding to the location of a respective character on said carrier; and

c. a loop spring arranged about said shaft to normally frictionally engage, and rotate with, said shaft, said spring having one end fixed relative to said type carrier and its other end fixed relative to said first element for causing said carrier and said first element to normally rotate with said spring, said spring being oriented to be expanded away from said shaft as the result of relative movement between said ends when said element is halted and said carrier undergoes such rotary movement relative to said first element in the direction of rotation of said shaft;

whereby such expansion of said spring interrupts the driving relation between said shaft and said spring.

2. A setting device as defined in claim 1, wherein said type carrier is mounted directly on said loop spring.

3. A setting device as defined in claim 2, wherein there are a plurality of said loop springs and said type carriers mounted on said driven shaft, said type carriers being mounted directly on the respective loop springs so that substantially no play in the lateral spacings of the type carriers on the drive shaft occurs, and wherein there are a plurality of said first elements each in the form of a stop disc mounted on a respective type carrier and coupled to the respective loop spring, said stop discs being operatively associated with said springs for arresting said carriers.

4. A setting device as defined in claim 3, wherein said stop discs are constructed of a lightweight material.

5. A setting device as defined in claim 4, wherein said type carriers are type wheels.

6. A setting device as defined in claim 5, wherein said second element comprises a detent latch for each of said stop discs, each detent latch having a detent and wherein said stop discs have recesses along their periphery and the respective detent latch is arranged to engage its detent into a recess of the respective stop discs to arrest the stop disc and wherein said device further comprises a printing ledge means for engaging the teeth in the periphery of said type wheels and moving the type wheels toward the platen.

7. A setting device as defined in claim 6, wherein said setting device further comprises carrier means mounting said type wheels for moving said type wheels toward the platen.

8. A setting device as defined in claim 7, wherein said carrier means is pivotally mounted.

9. A setting device as defined in claim 8, wherein said arresting means further comprises spring means for biasing each of said detent latches, and further including setting lever means for individually adjustably mounting each of said detent latches.

10. A setting device as defined in claim 9, wherein said setting device further comprises clutch means mounted for axial movement with respect to said driven shaft for connecting said driven shaft with a drive shaft.

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