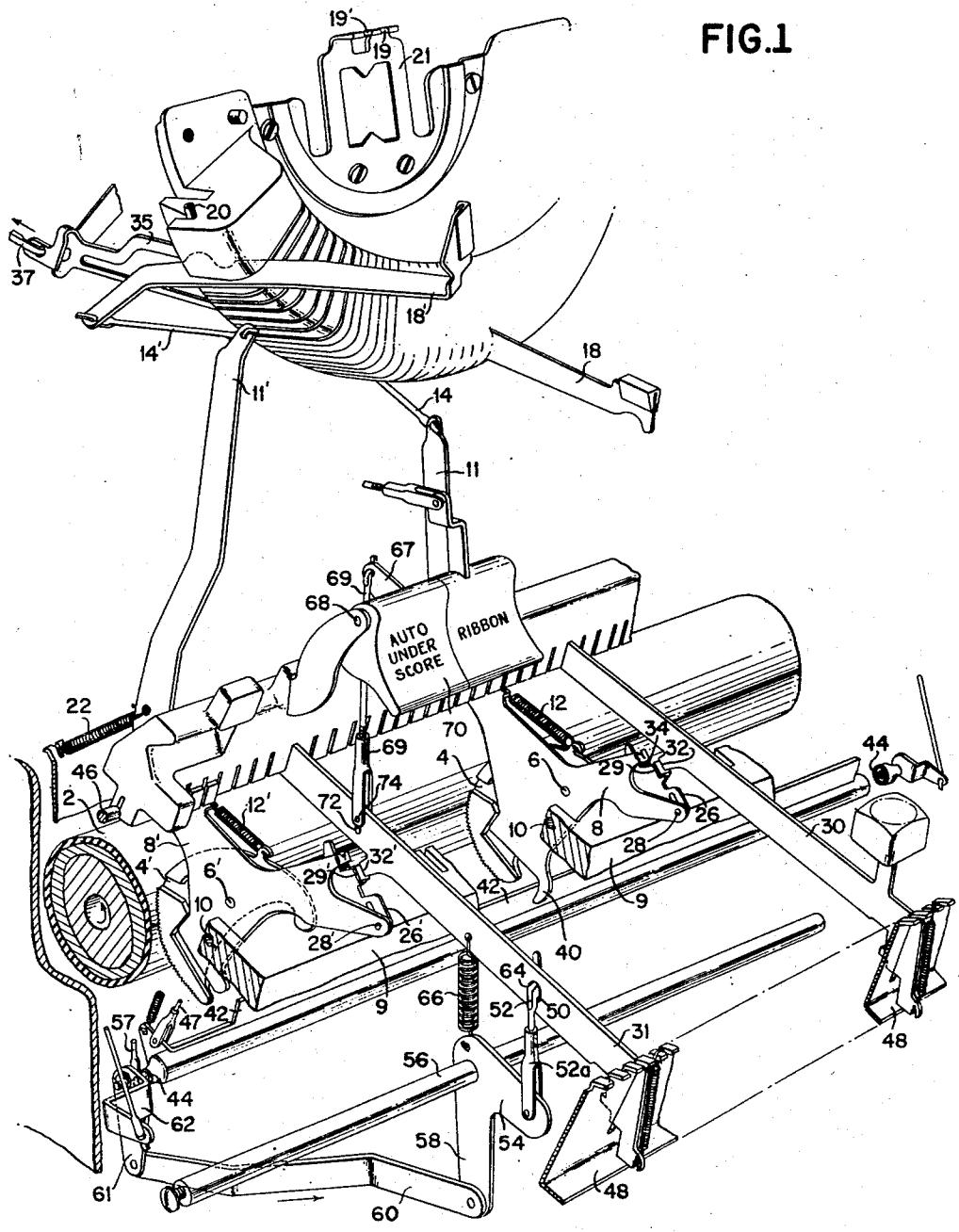
July 23, 1957 R. J. YOUNG 2,800,213

AUTOMATIC UNDERSCORING MECHANISM

Filed Jan. 6, 1955 2 Sheets-Sheet 1

FIG.1



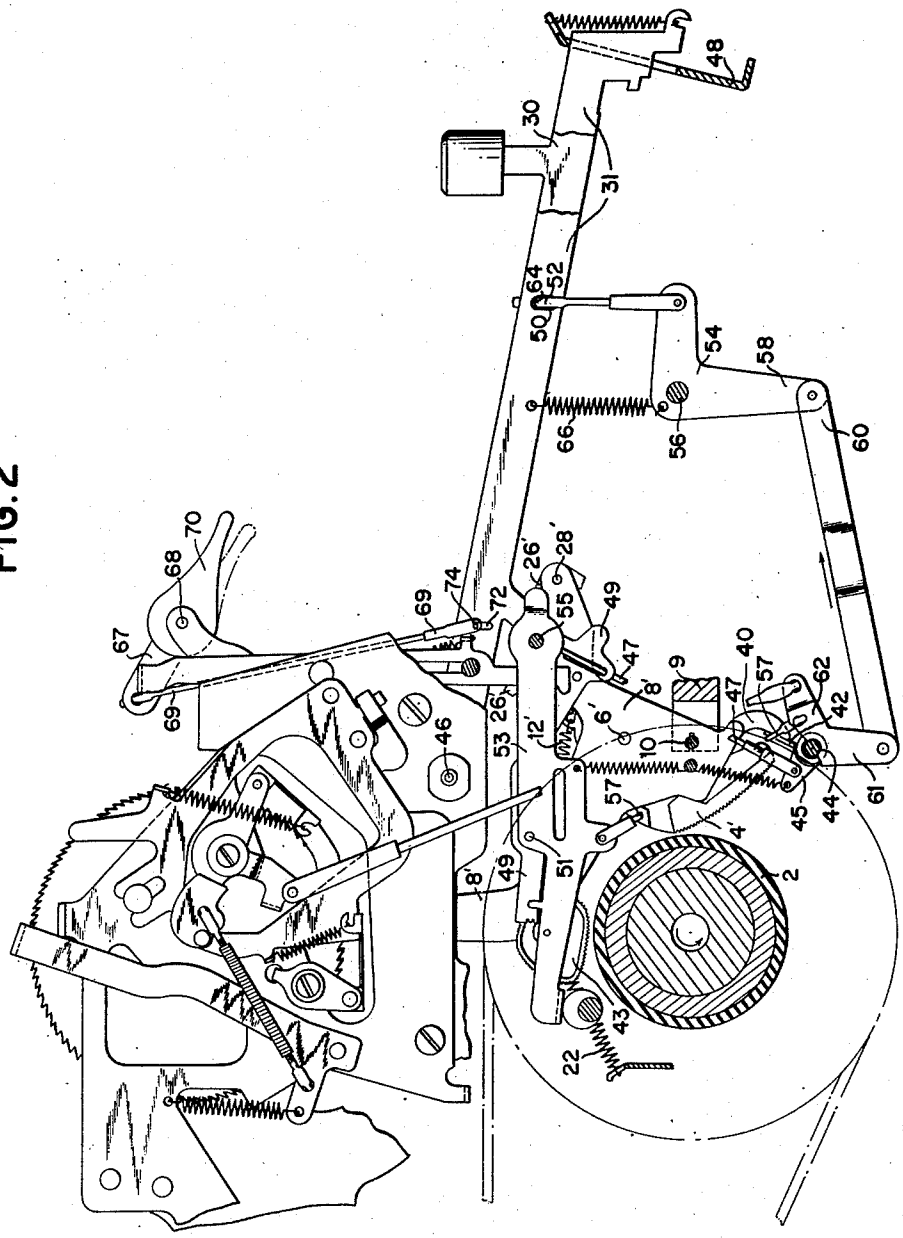
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Filed Jan. 6, 1955 2 Sheets-Sheet 2

FIG. 2



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2,800,213

AUTOMATIC UNDERSCORING MECHANISM

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Application January 6, 1955, Serial No. 480,094

5 Claims. (Cl. 197—113)

This invention relates to typewriters and more particularly to an automatic underscoring mechanism for power driven typewriters. In some industrial applications, it is necessary, for emphasis, to underscore certain words or phrases or even whole paragraphs. With the conventional typewriter, it would be necessary for the typist first to type out the intended wording and then go back and use another key to underscore each and every letter which she had previously typed. This is an obvious duplication of effort, and accordingly, it is the first object of this invention to provide an automatic underscoring device for a power driven typewriter.

It is a further object of this invention to provide a selectively operable automatic underscoring device for a power driven typewriter.

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:

Fig. 1 is a perspective view of components of a well known IBM electric typewriter.

Fig. 2 is an end view of some of the components of Fig. 1.

Briefly, this invention relates to the provision of an auxiliary type bar and its associated drive mechanism. The actuating lever for the auxiliary drive mechanism is spring biased into its operative position, and interconnected through a linkage system to a bail that is rocked each time any other type bar is driven to print position. The rocking of the bail lifts the auxiliary actuating lever to its inoperative position and then lets it fall again to its operative position thus causing its associated drive mechanism to drive the auxiliary type bar to printing position. The timing of the device is such that a carriage escapement action takes place before the auxiliary type bar is driven to print position, and accordingly, a second throat is provided on the type bar guide to receive the auxiliary type bar in such a position that it prints at the location of that character which had caused the escapement.

The operation of the type bar drive mechanism in an IBM typewriter is well known and more particularly disclosed in U. S. Patent No. 2,723,740. Consequently, it is felt that a simple description of the basic elements of a conventional type bar drive mechanism will suffice for the purpose of this description.

In the drawings, a continuously rotating power roll 2 is positioned for engagement with a plurality of cams 4, each of which is pivotally supported at 6 on its respective cam lever 8 which, in turn, is mounted in a guide 9 for pivotal movement about a supporting shaft 10 in response to engagement of the cam 4 with the power roll. Specifically, when the tread of the cam 4 is brought into engagement with the power roll, the cam is rocked about its pivot 6 and the increasing radius of the cam 4 necessarily

rocks the cam lever 8 about its pivot 10 until the point of maximum lift of the cam 4 engages the power roll, whereupon, as the cam lever 8 continues away from the power roll through its own momentum, a spring 12 restores the cam 4 to its normal or rest position.

The outer end 11 of cam lever 8 is connected by link 14 to the tail (not shown) of a type bar 18 which is pivotally mounted on the usual wire fulcrum 20 for movement from a rest position into printing position and return. A spring such as the one 22 acting on the cam lever 8' biases the type bar 18 normally to its rest position.

With this mechanism, when cam 4 is brought into engagement with the power roll, the cam lever 8 is rocked about its pivot 10 to drive a type bar 18 into the throat 19 of type bar guide 21 for printing engagement with a platen (not shown).

In order to actuate the type bar drive mechanism, a trip latch 26 is supported for both pivotal and transverse movement about pin 28 carried by the cam lever 8. More specifically, when a key lever 30 is depressed, a finger 32 engages the trip latch 26 to pivot it about its pivot point 28 and thus rocks the cam 4 about its pivot 6 and into engagement with the power roll 2 to institute the type bar drive action. If the key lever 30 is held down, however, after it has initiated a type bar print stroke, then the cam lever in returning to its rest position, causes the ear 29 of the trip latch to engage the side of finger 32 thus preventing the trip latch from returning to its original position. A spring 34 urges the trip latch 26 normally into its rest position and this spring is stretched when the ear 29 comes into engagement with the finger 32. If the key lever is again raised to its rest position, the spring 34 will pull on the trip latch and restore it to the position shown in the drawings, so that upon depression of the key lever 30, a new type bar print stroke will be brought about. This non-repeat principle is described in detail in U. S. Patent 2,723,740.

In accordance with the teachings of this invention, as will be hereinafter described, this non-repeat principle is utilized to prevent the operation of an auxiliary type bar drive mechanism until its actuating lever has first been restored to rest position.

Escapement

Before going further into detail with the operation of the underscoring mechanism, it is necessary to realize that an escapement action takes place after every character print stroke. The complete details of an escapement mechanism are shown in U. S. Patent No. 2,741,355 to Dodge. Generally speaking, every time a type bar goes into print position, it engages a U-bar 35 thereby moving link 37 in the direction of the arrow to effect an escapement operation.

Ribbon feed

Still another feature of the conventional typewriter is the mechanism for advancing an inking ribbon each time a type bar is actuated. The ribbon feed is described more particularly in U. S. Patent 2,616,547 to Dodge, but basically its operation is such that when the cam lever 8 is rocked about its pivot 10, a tail 40 engages a vane 42 which is mounted on the cross shaft 44 as shown in the aforementioned Patent 2,616,547. This rocking movement imparted to the vane 42 by tail 40 of the letter cam 8 conditions a ribbon feed cam 43 (Fig. 2) for operation to advance the ribbon in a well known manner. Actually, any slight counterclockwise rocking of vane 42 rocks an arm 45, acting through link 47 to pivot cam release arm 49 about its support 51 thereby permitting cam 43 to rotate through one revolution. The rotation of cam 43 rocks cam support 53 about pivot 55 thereby

pulling on link 57 to rock a bell crank 62 about the axis of shaft 44.

In accordnace with the teachings of this invention, the rocking of the vane 42 is employed to actuate the ribbon feed cam 43 and thereby actuate the underscoring mechanism as will be hereinafter described.

Underscoring mechanism

An auxiliary or underscore type bar 18' having an underscore mark at both its upper and lower case positions is provided with its respective return spring 22, and drive mechanism comprising a cam lever 8', cam 4', trip latch 26' having an ear 29', finger 32' and key or actuating lever 31. The auxiliary key lever 31 is shown as being pivotal about the usual pivot bail 46 and guided for movement in the usual guide comb 48. The key lever 31 is provided with an aperture 50 which is elongated so that a hook 52 may be freely movable up and down within the aperture a distance equal to the distance that the key lever would move from a rest to an actuating position. Hook 52 is carried by a link 52*a* mounted on a bell crank 54, which in turn, is pivotally mounted on a rod or stud 56. The opposite end 58 of the bell crank 54 is connected by link 60 to an arm 61 of bell crank 62 which, as heretofore mentioned, is rocked in response to the operation of ribbon feed cam 43. With this construction, when the tail 40 of the cam lever strikes the vane 42, shaft 44 is rocked counterclockwise, as shown in the drawings, under the influence of the ribbon feed cam to rock bell crank 62 and thereby push link 60 (in direction of arrow) to rock the bell crank 54 counterclockwise about the shaft 56 thereby raising the hook 52. If the key lever 31 were in its inactive (or non-printing) position, then the hook 52 will simply move to the upper limit 64 of the aperture 50 without moving the key lever at all. However, if the key lever were in its actuating position, as biased by the spring 66, then the rocking of bell crank 54 in response to the operation of the ribbon cam 43 will cause the key lever 31 to be raised from its actuating to its rest position in opposition to the force of spring 66. This motion of key lever 31, as heretofore described, will permit the ear 29' on the trip latch to slide under the finger 32' carried by key lever 31, whereupon when the bell crank 54 returns to its rest position shown in the drawings, key lever 31 will be moved again to its actuating position under the influence of spring 66, thus tripping its cam 4' into engagement with the power roll to cause the type bar 18' to print an underscore mark.

In order to disable the auxiliary key lever 31, a lever 67 is pivotally supported at 68 in the typewriter frame, and a button 70 extends out for finger operation. By depressing the finger button 70, the lever 67 is pivoted and acts through link 69 to raise the key lever from its actuated position as biased by the spring 66 to its inactive position. A suitable detent, not shown, is provided to hold lever 67 in either of its two positions. More specifically, an aperture 72 is provided in the key lever 31, and this aperture is elongated an amount equal to the key lever movement at that position from rest to actuating position. Link 69, in turn, is provided with a pin 74 passing through aperture 72, and accordingly, if the finger button 70 has been depressed to lift the key lever 31 to its inactive position, the pin 74 will act on the aperture 72 to raise the key lever so that the hook 52 will fall to the bottom of the aperture 50, whereupon the hook 52 is free to move in response to the actuation of the bell crank 54 without lifting key lever 31.

On the other hand, if the finger button 70 has been raised to permit the key lever 31 to move to its actuating position under the influence of spring 66, then since aperture 72 is elongated, the hook 52 acting on the aperture 50 can raise key lever 31 to its rest position and back to its biased position without being blocked by pin 74.

Operation

In the operation of this mechanism, and assuming the power roll is rotating, then as soon as the finger button 70 is raised (to the position of Fig. 2) the key lever 31 will be biased by spring 66 to its actuating position, whereupon the finger 32' will press on the ear 29' moving the trip latch 26' and, therefore, the cam 4' into the power roll to cause the type bar 18' to print. The key lever 31 will then stay in its depressed position, preventing a repeat operation of underscore until some other type bar has been moved to print position. When any other type bar has thus been driven to print position, the tail 40 of its cam lever 8 will act on the vane 42 to actuate the ribbon feed cam which will rock bell crank 62, and consequently, bell crank 54 to raise the key lever 31 to its inactive position, thus permitting the ear 29' to move up under the finger 32' under the influence of its spring 34'. Thereafter, when the bell crank 54 rocks back into its rest position, the key lever 31 will drop to its actuating position, tripping latch 26' to cause another print stroke of the auxiliary type bar 18'.

In order to prevent the underscore or auxiliary type bar from being self-actuating, it is necessary to remove the tail 40 of the letter cam lever 8', whereupon each time the cam lever 8' is rocked, to drive the auxiliary type bar 18' into printing position, the vane 42 will not be rocked under the influence of the cam lever and accordingly, bell crank 62 will not be operated to rock the bell crank 54.

It is further obvious that the auxiliary type bar 18' should not be operable to produce an escapement action, and accordingly, the auxiliary type bar 18' is notched at its point of engagement with the U-bar 35 so that the auxiliary type bar 18' can go into printing position without causing an escapement operation.

The timing of the subject mechanism is such that as soon as the type bar 18 enters the throat 19 of the type bar guide 21, the U-bar 35 will be moved to start an escapement action. The type bar 18 will print before the carriage moves any appreciable amount, but the carriage will have escaped a full character space before the auxiliary key lever 31 has been raised to its inoperative position and permitted to drop again to drive the type bar 18' into printing position. In order to compensate for this carriage escapement and to have the auxiliary type bar 18' print at the print position of the character that caused the escapement, a second throat 19' is provided in the type bar guide 21, which second throat 19' is displaced to the left of the throat 19 by one character space. The auxiliary type bar 18' is so shaped that in rocking about the pivot wire 20, it will enter the second throat 19' and accordingly, print at the character location of the type bar that had caused the escapement action.

With this structure, it is obvious that if the auxiliary key lever 31 is permitted to drop into its actuating position, the auxiliary type bar 18' will enter the throat 19' of the type bar guide 21 for a print stroke each time any other character has been printed. It follows, therefore, that in the operation of the automatic underscore, the first character to be underscored is first printed and then the finger button 72 is flipped to the actuating position, thus causing the underscore mark to print under the character which has previously been printed and from that point on, all printed characters will be automatically underscored.

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 scope of the following claims.

What is claimed is:

1. In a machine having a plurality of type bars, and

associated power driving mechanisms for selectively driving the same to printing position, a device automatically responsive to the selective actuation of any type bar drive mechanism for printing an auxiliary character, comprising an auxiliary type bar and associated power driving mechanism, an auxiliary key lever for actuating said auxiliary power driving mechanism, means biasing said auxiliary key lever to its operative position, means conditioning said auxiliary power driving mechanism to operate through one complete cycle only to drive said auxiliary type bar to printing position each time said auxiliary key lever is raised from its operative position to its rest position and then permitted to return under its biasing means to an actuating position, and means responsive to the actuation of any type bar drive mechanism for raising said auxiliary key lever to its rest position.

2. In a typewriter having a plurality of type bars, and associated power driving mechanisms for selectively driving the same to printing position, a device automatically responsive to the selective actuation of any type bar drive mechanism for printing an auxiliary character at the print position of the character previously selectively printed, comprising an auxiliary type bar, a power driving mechanisms therefor, an auxiliary key lever for actuating said auxiliary power driving mechanism, means biasing said auxiliary key lever to its operative position, means conditioning said auxiliary power driving mechanism for one cycle of operation only to drive said auxiliary type bar to printing position each time said auxiliary key lever is first raised from its operative position to its rest position and then permitted to return under its biasing means, and means responsive to the actuation of any type bar drive mechanism for raising said auxiliary key lever to its rest position, said auxiliary type bar having a print position displaced from that of any other type bar by one character space whereby said auxiliary type bar will print at the same position as the type bar selectively operated to actuate said auxiliary power driving mechanism.

3. In a typewriter having a carriage, a plurality of type bars, a plurality of power drive mechanisms for selectively driving said type bars to a first printing position, and an escapement action operable in response to any type bar being driven to said first printing position for moving the typewriter carriage one character position past the first printing position, a device automatically responsive to the selective actuation of any type bar drive mechanism for printing an auxiliary character at the character position previously printed by the selective actuation of a type bar drive mechanism, comprising an auxiliary type bar, power driving mechanism therefor, an auxiliary key lever for actuating said auxiliary power driving mechanism, means biasing said auxiliary key lever to operative position, means conditioning said auxiliary power driving mechanism to operate through one complete cycle to drive said auxiliary type bar to a second printing position each time said auxiliary key lever is first raised from its operative position to its rest position and then permitted to return under the influence of its biasing means, and means responsive to the actuation of any type bar drive mechanism for raising said auxiliary key lever to its rest position.

4. In a machine having a plurality of type bars, and associated power driving mechanisms for selectively driving the same to printing position, a device automatically responsive to the selective actuation of any type bar drive mechanism for printing an auxiliary character, comprising an auxiliary type bar and associated power driving mechanism, an auxiliary key lever for actuating said auxiliary power driving mechanism, means biasing said auxiliary key lever to its operative position, means conditioning said auxiliary power driving mechanism to operate through one complete cycle only to drive said auxiliary type bar to printing position each time said auxiliary key lever is raised from its operative position to its rest position and then permitted to return under its biasing means to an operative position, and means responsive to the actuation of any type bar drive mechanism for raising said auxiliary key lever to its rest position, said type bar drive responsive means comprising a common vane positioned to be actuated in response to the operation of any type bar drive mechanism, a first bell crank positioned for rocking movement, means for rocking said bell crank in response to the actuation of said common vane, a second bell crank operatively connected to said auxiliary key lever for raising said auxiliary key lever from its operative to its rest position, and linkage means interconnecting said first and second bell cranks whereby said auxiliary key lever is raised to its rest position each time said common vane is actuated.

5. In a machine having a plurality of type bars, and associated power driving mechanisms for selectively driving the same to printing position, a device automatically responsive to the selective actuation of any type bar drive mechanism for printing an auxiliary character, comprising an auxiliary type bar and associated power driving mechanism, an auxiliary key lever for actuating said auxiliary power driving mechanism, means biasing said auxiliary key lever to its operative position, means conditioning said auxiliary power driving mechanism to operate through one complete cycle only to drive said auxiliary type bar to printing position each time said auxiliary key lever is raised from its operative position to its rest position and then permitted to return under its biasing means to an operative position, means responsive to the actuation of any type bar drive mechanism for raising said auxiliary key lever to its rest position, and means disabling the automatic operation of said auxiliary key lever comprising manually movable means mounted on said machine selectively operable to hold said auxiliary key lever in its rest position and prevent its movement to its operative position.

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