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## (54) IMPROVEMENTS IN OR RELATING TO TYPING MACHINES


(71) We, SCM CORPORATION, of 299 Park Avenue, New York, New York 10017, United States of America, a corporation of the State of New York, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—


This invention relates to power driven typing machines.

Prior typing machines repeat key actions have a number of disadvantages. For example, the repeat timing is unregulated. The key action repeats whenever a preceding typing operation is completed. In the prior art, attempts have been made to attain higher typing speeds which have resulted in specific problems that include skipped and uneven typing operations because the pawl that initiates typing operations does not have enough time to fully engage the power roll. In addition, the repeat speed, in prior art devices, varies with the location of the key action in a typing machine. An upper bank *underline* repeats at a different speed than a lower bank *period* because of the different positions of the typebars in the typebar segment. As will become apparent from the following, the present invention enables the provision of a typing machine having a repeat key action in which the repeat timing is regulated, in which the action of the repeat key performs with substantially the same characteristics wherever the repeat key action is located in the typing machine, in which the single-action interposer cannot interfere with repeat typing machine operations and is positively restrained, in which the repeat interposer will not chatter against teeth on a power roll during depression of the key, and in which vibrations are not transmitted back to the key during repeat typing machine operations.

According to the invention, there is provided a typing machine comprising means for actuating a typing machine operation, a key lever movably mounted in the typing machine, a repeat interposer, means for shifting the repeat interposer upon depression of the key lever to a repeat position, a rotor being provided rotatably mounted in the typing machine and camming means on the rotor operable to cause the repeat interposer to engage the actuating means and thereby move the actuating means into engagement with the rotor to actuate the typing machine operation at a predetermined time during each revolution of the rotor when the key lever is in the repeat position.

Further, according to the invention, there is provided a typing machine comprising means for actuating a typing machine operation, a power roll rotatably mounted in the typing machine for engagement by the actuating means to actuate the typing machine operation, a key lever movably mounted in the typing machine, a single-action interposer, means for supporting the single-action interposer, means for shifting the single-action interposer against the actuating means to cause the actuating means to engage the power roll to actuate the typing machine operation upon depression of the key lever to a single-action position, a repeat interposer, means for supporting the repeat interposer for movement independent of the single-action interposer, means for biasing the repeat interposer toward the actuating means and toward the power roll, means for holding the repeat interposer away from the actuating means and away from the power roll, and means for releasing the repeat interposer from the holding means upon depression of the key lever to a repeat position so that the biasing means can bias the repeat interposer toward the actuating means and against the power roll, and means on the power roll for camming the repeat interposer to cause the repeat interposer to engage the actuating means to actuate the typing machine opera-

tion at a predetermined time during each revolution of the power roll when the key lever is in the repeat position.

In a hereinafter described preferred embodiment of the invention, a gap is provided between two teeth on the rotor in a typing machine repeat key action, so that a repeat typing operation can be initiated only when the cam follower surface on the repeat interposer engages the gap. When the key action is not in a repeat position, a latch and a forked lever cooperate to hold the repeat interposer away from the power roll so that the repeat interposer cannot chatter against teeth on the power roll. When the key action is in the repeat position, the forked-lever holds the single-action interposer out of the way. The gap prevents skipped and uneven repeat typing operations in high-speed operation by giving the actuator and the typebar enough time to settle into rest position. In addition, the gap enables the repeat key action to repeat at the same speed no matter where the repeat key action is located in the typing machine. During repeat typing operations, the repeat interposer is connected to the rest of the key action by only a tension spring between the repeat interposer and the latch. Therefore, vibrations cannot be transmitted back to a key on the key lever. Most of the moving parts can be stamped inexpensively from a sheet metal.

Other features and advantages of the invention and a fuller understanding thereof can be had by referring to the following description of a preferred embodiment of the invention which is illustrated in the accompanying drawings wherein:—

Figure 1 is a perspective view of a portion of a typing machine embodying the invention;

Figure 2 is a right side elevation view of the typing machine shown in Figure 1 with the key action in rest position;

Figure 3 is a view similar to that of Figure 2 just after tripping of the key action to initiate a single typing operation;

Figure 4 is a view similar to that of Figure 3 after further depression of the key to a repeat position;

Figure 5 is a view similar to that of Figure 4 with the power roll rotated to permit a repeat typing operation;

Figure 6 is a view similar to that of Figure 5 with the key action partially restored toward the rest position; and

Figure 7 is a partial view similar to that of Figure 6, but showing a different key.

With initial reference to Figure 1 of the drawings, the invention is shown embodied in a repeat key action in a typing machine represented by portions selected for their cooperative relevance to the invention. The term "typing machine" as used herein applies to any one of many different kinds of machines such as typewriters, ball printers, printers for computers, teletypewriters, adding machines, calculators, cash registers, and the like.

As shown in Figure 1, the key action (omitting temporarily the repeat portion) includes a key 12 mounted on a key lever 14 that is pivotally connected to a key lever support comb 16 by a pivot pin 18 and vertically guided by a key lever guide comb 20. A cantilever flat spring 22 mounted on the key lever support comb 16 biases the key lever 14 upward against a stop 24 on the key lever support comb 16. The stop 24 is composed of vinyl plastic or other suitable material.

A nose 26 on the key lever 14 engages a single-action interposer 28, while a prong 30 on the single-action interposer 28 extends into an arcuate coil spring 32. The arcuate coil spring 32 is straight when disassembled. The arcuate coil spring 32 is impaled on a spike 34 on a plate 36 that is connected to the key lever support comb 16.

The single-action interposer 28 is poised above a pawl 38 that is positioned to engage a rotor in the form of a power roll 40. The pawl 38 is pivotally connected to an actuator 42 that in turn is pivotally connected to the key lever support comb 16. A coil tension spring 44 connected between the pawl 38 and the actuator 42 biases the pawl 38 clockwise against a bent ear 46 on the actuator 42, while a coil tension spring 48 connected between the actuator 42 and a bracket 50 on a typebar segment 52 biases the actuator 42 against an actuator stop bar 54. A link 56 pivotally connects the actuator 42 to a typebar 58 that in turn is pivotally connected to the typebar segment 52 and is normally disposed against a typebar rest 60. When actuated, the typebar 58 (guided by a typebar guide 62 mounted on the typebar segment 52) strikes a platen 64. Although the key action has been described in the singular, a complete typing machine could have as many as forty-four or more key actions. The key lever support comb 16, key lever guide comb 20, and typebar segment 52 help guide and prevent lateral movement of the key action.

The repeat portion of the key action includes a bell crank 66 pivotally connected to the key lever 14 with a bent projection 68 on the bell crank 66 biased against the key lever 14 by a coil tension spring 70 connected between the bell crank 66 and the key lever 14. A forked lever 72 in turn is pivotally connected to the bell crank 66. The forked lever 72 has a first upper and a second lower prongs 74 and 76 pivotally embracing a shelf 78, and a bent projection 80 for engaging a latch 82 that is

pivotally mounted between two spikes 34 on the plate 36 and rests against a latch stop wall 84 connected to the key lever guide comb 20. A coil tension spring 86 connects the latch 82 to the front end 88 of a repeat interposer 90 that is pivotally mounted over the rear edge 92 of the plate 36. The repeat interposer 90 is held in rest position by the lower prong 76 of the forked lever 72.

Figures 2 to 6 represent successive steps during a repeat typing operation. Other repeat typing machine operations are also possible using the invention such as spacing and so forth. For completeness, Figure 2 shows the repeat key action in rest position as in Figure 1.

As shown in Figure 3, initial depression of the key lever 14 to a single-action position causes a heel 94 on the key lever 14 to push the arcuate coil spring 32 forward (to the left) to pull the single-action interposer 28 until a ledge 96 on the single-action interposer 28 falls off the shelf 78 on the key lever support comb 16. The top of the arcuate coil spring 32 between the heel 94 on the key lever 14 and the prong 30 on the single-action interposer 28 then pivots about the heel 94 and snaps the single-action interposer 28 against the pawl 38 and the pawl 38 counter-clockwise against the bent ear 46 on the actuator 42 and against the power roll 40. One of multiple teeth 98 on the power roll 40 engages the pawl 38 to pivot the actuator 42 and (through the link 56) the typebar 58 clockwise to perform a typing operation. Since the nose 26 on the key lever 14 is not, at this stage, in contact with the single-action interposer 28, no irritating jolt can be transmitted back to the key 12 on the key lever 14.

Further depression of the key lever 14 into a lower repeat position is met by increased resistance as the coil tension spring 70 between the key lever 14 and the bell crank 66 joins the cantilever flat spring 22 in offering resistance, and downward movement of the key lever 14 is limited by a space bar shaft 100. As the key lever 14 moves downward, a finger 102 on the bell crank 66 engages the top of the key lever support comb 16 to pivot the bell crank 66 counterclockwise relative to the key lever 14. The repeat key action can be adjusted by insertion of a screwdriver or other suitable tool into a slot 104 in the finger 102 and bending the finger 102 to advance or delay contact of the finger 102 with the top of the key lever support comb 16 and, consequently, to advance or delay movement into the repeat position signalled by initial stretching of the coil tension spring 70 between the key lever 14 and the bell crank 66. As the bell crank 66 pivots counterclockwise, the forked lever 72 pivots about the shelf 78, the upper prong 74 on the forked lever 72 holds the single-action interposer 28 away from the pawl 38, the latch 82 takes over the job of holding the repeat interposer 90 in the rest position, the bent projection 80 on the forked lever 72 engages the latch 82 to unlatch the repeat interposer 90, and the coil tension spring 86 between the repeat interposer 90 and the latch 82 biases and pivots the repeat interposer 90 toward the power roll 40 so that a cam follower surface 106 on the repeat interposer 90 bears against the teeth 98 on the power roll 40.

A repeat typing operation is not possible, however, until the cam follower surface 106 on the repeat interposer 90 engages a camming means in the form of a reduced-radius portion or gap 108 between two of the teeth 98 on the power roll 40 as shown in Figure 5. The camming means could also be, for example, a reduced-radius portion or an increased-radius portion on a cam. The gap 108 is slightly wider than the thickness of the repeat interposer 90. When the cam follower surface 106 engages the gap 108, the rear end 110 of the repeat interposer 90 engages the pawl 38 to pivot the pawl 38 counterclockwise against the bent ear 46 on the actuator 42 and against the power roll 40. The tooth 98 on the power roll 40 adjacent to the clockwise side of the gap 108 engages the pawl 38 to pivot the actuator 42 and (through the link 56) the typebar 58 clockwise to perform a repeat typing operation. Since at this stage the repeat interposer 90 is connected to the rest of the key action by only the coil tension spring 86 between the repeat interposer 90 and the latch 82, no irritating jolt can be transmitted back to the key 12 on the key lever 14. As long as the key lever 14 is held in the repeat position, the rear end 110 of the repeat interposer 90 will initiate a repeat typing operation each time the cam follower surface 106 on the repeat interposer 90 engages the gap 108 on the power roll 40. The gap 108 effectively regulates the speed of the repeat typing operations by permitting only one repeat typing operation during each revolution of the power roll 40. Since the power roll 40 revolves at approximately 585 revolutions per minute (slightly slower while typing), one typing operation per revolution is fast enough.

Upon release of the key 12, the key action begins to return to the rest position as shown in Figure 6. As the cantilever flat spring 22 lifts the key lever 14, the coil tension spring 70 between the key lever 14 and the bell crank 66 pivots the bell crank 66 clockwise so that the bent projection 80 on the forked lever 72 no longer en-

gages the latch 82. Simultaneously, the lower prong 76 on the forked lever 72 pivots the repeat interposer 90 about the rear edge 92 of the plate 36 to store potential energy in the coil tension spring 86 that is between the repeat interposer 90 and the latch 82, and the repeat interposer 90 again engages the latch 82. As the key lever 14 moves out of the repeat position into the single-action position, the nose 26 on the key lever 14 lifts the single-action interposer 28 to store potential energy in the arcuate coil spring 32 by recocking the arcuate coil spring 32.

Thus far, the key lever 14 that has been described is for a key 12 that is nearest to the operator. Typically, the key 12 would be for a symbol that is often repeated in clusters such as an *x* or a *period*. Figure 7 shows a key lever $14^1$ for a key $12^1$ that is farthest from the operator. The key $12^1$ could be for an upper case *underline* and a lower case *hyphen*. For ease of comparison, the key action is in the same partially restored position as the key action in Figure 6, and the same reference numerals have been used, but distinguished by primes for the parts that are not common to the two key actions.

In Figure 7 the only parts that are shaped differently are the key lever $14^1$ and the bell crank $66^1$. The key $12^1$ is farther to the rear (to the right) on the key lever $14^1$, and the nose $26^1$ that engages the single-action interposer $28^1$ is on the bell crank $66^1$ instead of on the key lever $14^1$. The nose $26^1$ contacts the single-action interposer $28^1$ farther to the rear (to the right) than the nose 26 previously described in order to cause the different-length key levers 14 and $14^1$ to trip and restore the single-action interposers 28 and $28^1$ at the same times. The operation and typing characteristics of the key action are the same as that previously described.

Although the invention has been described in its preferred form with a certain degree of particularity, it is understood that the present disclosure of the preferred form has been made by way of example and that numerous changes in the details of construction and the combination and arrangement of parts can be resorted to without departing from the scope of the invention as hereinafter claimed.

WHAT WE CLAIM IS:—

1. A typing machine comprising means for actuating a typing machine operation, a key lever movably mounted in the typing machine, a repeat interposer, means for shifting the repeat interposer upon depression of the key lever to a repeat position, a rotor being provided rotatably mounted in the typing machine and camming means on the rotor operable to cause the repeat interposer to engage the actuating means and thereby move the actuating means into engagement with the rotor to actuate the typing machine operation at a predetermined time during each revolution of the rotor when the key lever is in the repeat position.

2. A typing machine as claimed in claim 1, wherein the camming means comprises a reduced-radius portion of the rotor.

3. A typing machine as claimed in claim 1, wherein the rotor has a plurality of teeth thereon, the camming means comprising a gap between two of the teeth.

4. A typing machine as claimed in any of the preceding claims, further comprising means for holding the repeat interposer away from the rotor until the key lever is in the repeat position.

5. A typing machine as claimed in claim 4, in which the holding means includes a latch for holding the repeat interposer away from the rotor until the key lever is in the repeat position.

6. A typing machine comprising means for actuating a typing machine operation, a power roll rotatably mounted in the typing machine for engagement by the actuating means to actuate the typing machine operation, a key lever movably mounted in the typing machine, a single-action interposer, means for supporting the single-action interposer, means for supporting the single-action interposer, means for shifting the single-action interposer against the actuating means to cause the actuating means to engage the power roll to actuate the typing machine operation upon depression of the key lever to a single-action position, a repeat interposer, means for supporting the repeat interposer for movement independent of the single-action interposer, means for biasing the repeat interposer toward the actuating means and toward the power roll, means for holding the repeat interposer away from the actuating means and away from the power roll, and means for releasing the repeat interposer from the holding means upon depression of the key lever to a repeat position so that the biasing means can bias the repeat interposer toward the actuating means and against the power roll, and means on the power roll for camming the repeat interposer to cause the repeat interposer to engage the actuating means to actuate the typing machine operation at a predetermined time during each revolution of the power roll when the key lever is in the repeat position.

7. A typing machine as claimed in claim 6, wherein the power roll has a plurality of teeth thereon and the camming means comprises a gap between two of the teeth.

8. A typing machine as claimed in claim

gages the latch 82. Simultaneously, the lower prong 76 on the forked lever 72 pivots the repeat interposer 90 about the rear edge 92 of the plate 36 to store potential energy in the coil tension spring 86 that is between the repeat interposer 90 and the latch 82, and the repeat interposer 90 again engages the latch 82. As the key lever 14 moves out of the repeat position into the single-action position, the nose 26 on the key lever 14 lifts the single-action interposer 28 to store potential energy in the arcuate coil spring 32 by recocking the arcuate coil spring 32.

Thus far, the key lever 14 that has been described is for a key 12 that is nearest to the operator. Typically, the key 12 would be for a symbol that is often repeated in clusters such as an *x* or a *period*. Figure 7 shows a key lever $14^1$ for a key $12^1$ that is farthest from the operator. The key $12^1$ could be for an upper case *underline* and a lower case *hyphen*. For ease of comparison, the key action is in the same partially restored position as the key action in Figure 6, and the same reference numerals have been used, but distinguished by primes for the parts that are not common to the two key actions.

In Figure 7 the only parts that are shaped differently are the key lever $14^1$ and the bell crank $66^1$. The key $12^1$ is farther to the rear (to the right) on the key lever $14^1$, and the nose $26^1$ that engages the single-action interposer $28^1$ is on the bell crank $66^1$ instead of on the key lever $14^1$. The nose $26^1$ contacts the single-action interposer $28^1$ farther to the rear (to the right) than the nose 26 previously described in order to cause the different-length key levers 14 and $14^1$ to trip and restore the single-action interposers 28 and $28^1$ at the same times. The operation and typing characteristics of the key action are the same as that previously described.

Although the invention has been described in its preferred form with a certain degree of particularity, it is understood that the present disclosure of the preferred form has been made by way of example and that numerous changes in the details of construction and the combination and arrangement of parts can be resorted to without departing from the scope of the invention as hereinafter claimed.

WHAT WE CLAIM IS:—

1. A typing machine comprising means for actuating a typing machine operation, a key lever movably mounted in the typing machine, a repeat interposer, means for shifting the repeat interposer upon depression of the key lever to a repeat position, a rotor being provided rotatably mounted in the typing machine and camming means on the rotor operable to cause the repeat interposer to engage the actuating means and thereby move the actuating means into engagement with the rotor to actuate the typing machine operation at a predetermined time during each revolution of the rotor when the key lever is in the repeat position.

2. A typing machine as claimed in claim 1, wherein the camming means comprises a reduced-radius portion of the rotor.

3. A typing machine as claimed in claim 1, wherein the rotor has a plurality of teeth thereon, the camming means comprising a gap between two of the teeth.

4. A typing machine as claimed in any of the preceding claims, further comprising means for holding the repeat interposer away from the rotor until the key lever is in the repeat position.

5. A typing machine as claimed in claim 4, in which the holding means includes a latch for holding the repeat interposer away from the rotor until the key lever is in the repeat position.

6. A typing machine comprising means for actuating a typing machine operation, a power roll rotatably mounted in the typing machine for engagement by the actuating means to actuate the typing machine operation, a key lever movably mounted in the typing machine, a single-action interposer, means for supporting the single-action interposer, means for supporting the single-action interposer, means for shifting the single-action interposer against the actuating means to cause the actuating means to engage the power roll to actuate the typing machine operation upon depression of the key lever to a single-action position, a repeat interposer, means for supporting the repeat interposer for movement independent of the single-action interposer, means for biasing the repeat interposer toward the actuating means and toward the power roll, means for holding the repeat interposer away from the actuating means and away from the power roll, and means for releasing the repeat interposer from the holding means upon depression of the key lever to a repeat position so that the biasing means can bias the repeat interposer toward the actuating means and against the power roll, and means on the power roll for camming the repeat interposer to cause the repeat interposer to engage the actuating means to actuate the typing machine operation at a predetermined time during each revolution of the power roll when the key lever is in the repeat position.

7. A typing machine as claimed in claim 6, wherein the power roll has a plurality of teeth thereon and the camming means comprises a gap between two of the teeth.

8. A typing machine as claimed in claim 13

6 or claim 7, wherein the holding means comprises a latch for holding the repeat interposer away from the actuating means and the power roll until the key lever is in the repeat position.

9. A typing machine as claimed in any of claims 6 to 8, wherein the biasing means comprises a tension spring connected between the repeat interposer and the latch.

10. A typing machine as claimed in any of claims 6 to 9, wherein the holding means comprises a forked lever having a first prong for holding the repeat interposer away from the actuating means and the power roll when the key lever is in a rest position and the single-action position and a second prong for holding the single-action interposer away from the actuating means when the key lever is in the repeat position, means being provided for pivoting the forked lever relative to the key lever during depression of the key lever, the forked lever being pivotally connected to the pivoting means.

11. A typing machine as claimed in claim 10, wherein the pivoting means comprises a bell crank pivotally connected to the key lever.

12. A typing machine as claimed in claim 10 or 11, wherein the holding means further includes a latch for holding the repeat interposer away from the actuating means and the power roll until the key lever is in the repeat position.

13. A typing machine substantially as herein described with reference to the accompanying drawings.

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