VARIEABLE SPACING MECHANISM FOR TYPEWRITERS

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This invention relates to variable spacing mechanisms for typewriters and the like comprising a toothed escapement member urged in a letter-feed direction and normally engaged by movable dog means against said urge, said dog means being mounted for engagement with and disengagement from said escapement member and for a variable retrograde movement counter to said direction.

In the known mechanisms of this kind the variable extent of the retrograde movement of the movable dog means is controlled by a set of selecting members rotatable immediately upon depression of a selected key, whereupon the movable dog means are disengaged under the control of the conventional universal bar operable by the type lever just before striking the platen. The two different control devices provided to this end require intricate adjusting means for exactly timing their operation.

In a known variable spacing mechanism a selecting member set for controlling the retrograde movement is additionally operable by said universal bar to disengage the movable dog. To this end each selecting member is operatively associated with an individual arresting member for the movable dog, whereby undesirable clearances are unavoidable between a set selective member and its associated arresting member. Furthermore, the selecting members are moved first according to a first direction for controlling the retrograde movement and then second direction for disengaging the movable dog, whereby the mechanism becomes expensive to be manufactured.

The primary object of the invention is to provide a variable spacing mechanism of a very reliable operation obviating these disadvantages.

A more specific object of the invention is to provide a variable spacing mechanism wherein no adjusting means are required for timing the disengagement of the movable dog means with respect to its retrograde movement.

Another object of the invention is to provide efficiently manufacturable escapement member and movable dog means, the latter being formed by a plurality of movable dogs mutually offset by whole units of spacing.

According to the invention, in a variable spacing mechanism having a toothed escapement member urged in a letter-feed direction, movable dog means normally engaged with said escapement member against said urge, and means mounting said movable dog means for engagement with and disengagement from said escapement member and for a variable retrograde movement counter to said direction, I now provide a set of elements selectively operable for in a single stroke disengaging said movable dog means and entering the path thereof to arrest said retrograde movement.

Further objects, features and advantages of the invention will become apparent from the following detailed description of two preferred embodiments thereof, taken in conjunction with the accompanying drawings, wherein:

Fig. 1 is a partial perspective view of a variable spacing mechanism according to a first embodiment of the invention incorporated in a typewriter.

Fig. 2 is a partial view of the mechanism of Fig. 1; Fig. 3 is a right hand sectional view of the mechanism of Fig. 1; Fig. 4 is a partial perspective view of a variable spacing mechanism according to a second embodiment of the invention.

With reference to Fig. 1, the numeral 4 indicates a toothed escapement member or rack secured to the conventional paper carriage of a typewriter. The rack 4 is formed with teeth spaced apart at a plurality of three unit intervals of spacing and is positively urged by a spring not shown in the drawings in a letter-feed direction represented by the arrow 5. The rack 4 is normally engaged against said urge by movable dog means formed of a plurality of three movable dogs 6, 7 and 8 mutually offset by whole units of spacing, namely one unit of spacing (Fig. 2).

Means are provided for mounting the movable dog means for engagement with and disengagement from the escapement member 4 and for a variable retrograde movement counter to the direction of the arrow 5. Said mounting means comprise a stationary shaft 10 cooperating with a slot 9 provided in each one of the movable dogs 6, 7 and 8 and arranged substantially parallel to the rack 4. Furthermore, comprised in said mounting means is a pin 11 secured to the lower movable dog 8 and engaging a slot 12 for each one of the dogs 6 and 7.

Three springs 13 individually urge the dogs 6, 7 and 8 to normally engage with the rack 4 against the impulsive urge of its spring and, upon disengagement thereof, by rocking about the shaft 10 to variably retrograde counter to the direction of the arrow 5.

The pin 11 enables the dogs 6, 7 and 8 to be simultaneously shifted parallel to the rack 4, which by engaging a single dog (in Fig. 1 the dog 7), urges all the dogs to pivot against the shaft 10 (see Figs. 1 and 2). The slots 12 enable the dogs 6, 7 and 8 to be rocked differentially in order to individually engage the rack 4. In Figs. 1 and 2 the tooth 14 of the rack 4 is engaged by the middle dog 7, while the dog 8 contacts the rear edge of said tooth 14 and the dog 6 contacts the rear edge of the tooth 15 of the rack 4.

It will be apparent that the rack 4, having its teeth spaced apart three unit intervals of spacing, as well as the individual dogs 6, 7 and 8, may be efficiently manufactured to support the repeated shocks involved.

According to the invention a set of elements 19 are selectively operable for in a single stroke disengaging the movable dogs 6, 7 and 8 and entering the path thereof to arrest their retrograde movement. More particularly, each element 19 is formed of the upper projection of a lever 20 of a set of adjacent levers fulcrummed on a common pivot 21 secured to a plate 22 and is adapted to cooperate with a control edge of each one of the movable dogs 6, 7 and 8 as will be hereinafter described. The levers 20 are spaced apart one unit interval of spacing.

The horizontal arm of each lever 20 is connected to an individual lever 30 (Fig. 3) fulcrummed on a common pivot 31 secured to the plate 22 and urged counterclockwise by a spring 32. Each lever 30 is in turn connected by means of a wire link 33 to an individual universal ball 34, 35 pivoted on a shaft 36. The universal balls 34 are selectively operable by a number of key-controlled setting members 37.

According to the embodiment of Figs. 1 to 3 the control edge of the dogs 6, 7 and 8 comprises, in order, in the direction of the arrow 5, a straight guiding portion 16, a reengagement control portion formed of a cut-out slot 17 and an arresting portion or shoulder 18 projecting with respect to the guiding portion 16.

The spacing mechanism according to this embodiment operates as follows:
Upon depression of a key the corresponding setting member 37 (Fig. 3) is shifted leftwards whereby at the end of its forward stroke its projection 38 selectively operates one of the universal balls 50 through the link 33 and the lever 30 rocks its associated lever 20 counterclockwise, whose associated projection 19 is thus operable for in a single stroke cooperating with said guiding portion 16 to bodily rock the movable dogs 6, 7 and 8 about the shaft 10 and disengage from the rack 4, and simultaneously entering the path of the arresting portion or shoulder 18 thereof to arrest the retrograde movement after a variable extent.

Upon being disengaged the movable dogs 6, 7 and 8 are bodily shifted rightwards by their springs 13 and are guided by the projection 19 of the rocked lever 20 along the guiding portion 16 of their control edge.

When the slot 17 of the movable dogs 6, 7 and 8 reaches the rocked lever 20, the shoulder 18 is arrested by the projection 19 after a retrograde movement of the movable dogs corresponding to the rocked lever 20 and the slot 17 enables the movable dogs to reengage the rack 4.

Due to the inertia of the paper carriage the movable dogs reengage the rack before the latter has started moving. When the rocked lever 20 is restored by its spring 32 the rack 4 by the urge of its spring restores the movable dogs 6, 7 and 8 leftwards until arrested by the shaft 10.

It will be apparent that the travel of the rack 4 in letter-feed direction is arrested by that one of the movable dogs which upon reengaging the rack is nearest the forward edge of a tooth thereof. The travel of the rack 4 will thus be equal to the retrograde movement of the movable dogs according to the position of the rocked lever 20. More particularly, the four levers 20 of Fig. 1 beginning from the left enable the rack 4 to be moved through two, three, four and five unit intervals of spacing.

Since the spacing of a lower case character may be different from the spacing of the corresponding upper case character a second projection 39 is provided on the setting members 37 which may operate the universal bars 34 when an upper case character is printed, the shaft 36 being bodily movable with the conventional type bar segment of the typewriter.

To avoid damage where the movable dogs 6, 7 and 8 are not reengaged before the rack 4 starts moving, there is provided a fixed dog 28 pivoted on the shaft 10 below the movable dogs 6, 7 and 8. The trolleyed by a lever 24 fullcrummed on a pivot 23 of the plate 22 and provided with a universal member such as a pin 25 urged by a spring 27 to contact the right edge of a slot 26 of each one of the levers 20 (Fig. 3). The dog 28 is normally kept disengaged from the rack 4 by the spring 27 which is stronger than the spring 29.

When a lever 20 is rocked counterclockwise, through the pivot 25 it rocks the lever 24 clockwise thus releasing the fixed dog 28 which may engage with the rack 4 by the urge of the spring 29. The accidental movement of the rack 4 before being reengaged by the movable dogs 6, 7 and 8 may thus be arrested after a maximum travel of three unit intervals of spacing thus avoiding any damage of the spacing mechanism. When the rocked lever 20 is restored the spring 27 disengages the fixed dog 28 whereby the rack 4 remains under the sole control of the movable dogs 6, 7 and 8.

According to the second embodiment of the invention shown in Fig. 4 the control edge of each movable dog 6, 7 and 8 comprises but a guiding portion 16 and an arresting portion 18, whereby the movable dogs 6, 7 and 8 cannot automatically reengage the rack 4 upon being arrested by the projection 19 of the rocked lever 20.

Furthermore, the embodiment of Fig. 4 comprises fixed dog means formed of a plurality of normally disengaged fixed dogs such as three adjacent levers 45, 46 and 47 pivoted on the pin 23 of the plate 22, the levers 45, 46 and 47 being spaced apart one unit interval of spacing. By the urge of an individual spring 48 the levers 45, 46 and 47 normally contact a bent log 49 of a general purpose bar. A set of elements selectively rockable by a spring 51 to contact the horizontal arm of the levers 20.

Upon rocking a lever 20 counterclockwise as described above, the movable dogs 6, 7 and 8 are disengaged from the rack 4 to be retrograded by their springs 13 as usual, and the bent log 49 is rocked counterclockwise, thus releasing the levers 45, 46 and 47 which now engage the rack 4. The rack 4 will thus be permitted to move in letter-feed direction through a second variable extent according to the previous retrograde movement of the movable dogs until arrested by the shaft 10 by the intermediary of one of said dogs.

It is desirable for certain kinds of typewritten matter to write the characters with slightly increased spacing. To this end the plate 22 (Figs. 1, 3 and 4) carrying the pivots 21, 23 and 31, is rockably mounted on two stationary pivots 40 (Fig. 1) and is urged by a spring 41 (Fig. 1) to contact a projection 42 of a manually operable slide 43 slidably mounted on a stationary pin 44.

Upon operating the slide 43 it will be shifted rightwards, thus enabling the plate 22 to be rocked about the pivots 40 by the urge of the spring 41. The set of projections 19 of the levers 20 are thus shifted rightwards away from the shoulder 18 one unit interval of spacing. The projections 19 will thus arrest the movable dogs 6, 7 and 8 so as to increase their retrograde movement a constant extent, namely one unit interval of spacing.

It will be noted that the pin 31 and the lower arm of the levers 30 are arranged along the rotational axis of the pivots 40, whereby the action of the universal balls 34 on the levers 20 remains unaffected when the plate 22 is rocked.

It will be understood that many changes and improvements in the form and details of the mechanism illustrated may be made by those skilled in the art without departing from the limits of the invention.

What I claim is:

1. In a variable spacing mechanism, a toothed escape ment member urged in a letter-feed direction, movable dog means normally engaged with said escapement member against said urge, means mounting said movable dog means for engagement with and disengagement from said escapement member and for a variable retrograde movement counter to said direction, a set of elements selectively operable for in a single stroke disengaging said movable dog means and entering the path thereof to arrest said retrograde movement, and a set of universal bars associated with said elements, each one of said universal bars being movable for operating its associated element.

2. In a variable spacing mechanism, a toothed escape ment member urged in a letter-feed direction, movable dog means normally engaged with said escapement member against said urge, means mounting said movable dog means for engagement with and disengagement from said escapement member, a variable retrograde movement counter to said direction, a set of elements selectively rockable for in a single stroke disengaging said movable dog means and entering the path thereof to arrest said retrograde movement, and a set of universal bars associated with said levers, each one of said universal bars being operable for rocking its associated lever.

3. In a variable spacing mechanism, a toothed escape ment member urged in a letter-feed direction, movable dog means normally engaged with said escapement member against said urge, means mounting said movable dog means for engagement with and disengagement from said escapement member and for a variable retrograde movement counter to said direction, a set of elements selectively operable for in a single stroke disengaging said movable dog means and entering the path thereof to arrest
said retrograde movement, a common support for mounting said set of elements, and means for moving said support to shift said set counter to said direction in order to increase said retrograde movement a constant extent.

4. In a variable spacing mechanism, a toothed escapement member urged in a letter-feed direction, movable dog means normally engaged with said escapement member against said urging, said movable dog means comprising a guiding portion and an arresting portion, means mounting said movable dog means for engagement with and disengagement from said escapement member and for a variable retrograde movement counter to said direction, each movable dog having a control edge comprising, in order in said direction, a straight guiding portion, a cut-out portion and an arresting portion, means rockably mounting said movable dogs for engagement with and disengagement from said escapement member and shiftably mounting said movable dogs for said retrograde movement, and a set of adjacent levers spaced apart one unit interval of spacing and having a projection on each lever, said levers being selectively rockable to cause the associated projections to engage said guiding portion to rock said movable dogs and disengage same and to enter the path of said arresting portion to arrest said retrograde movement, said cut-out portion enabling said movable dogs to reengage said escapement member when said arresting portion is arrested by the projection of the rocker lever.

9. In a variable spacing mechanism as defined by claim 8, a normally disengaged fixed dog for said escapement member, and a universal member conditionable by said levers upon being rocked for engaging said fixed dog with said escapement member.

10. In a variable spacing mechanism, a toothed escapement member urged in a letter-feed direction, movable dog means normally engaged with said escapement member against said urging, means mounting said movable dog means for engagement with and disengagement from said escapement member and for a variable retrograde movement counter to said direction, a plurality of movable dogs normally engaged with said escapement member against said urging, means mounting said movable dog means for engagement with and disengagement from said escapement member and for a variable simultaneous retrograde movement counter to said direction, a plurality of movable dogs normally engaged with said escapement member against said urging, movable dogs being mutually off-set by whole units of spacing, each movable dog comprising a guiding portion and an arresting portion, means mounting said movable dogs for engagement with and disengagement from said escapement member and shiftably mounting said movable dog means for said retrograde movement, and a set of elements selectively operable for in a single forward stroke engaging said fixed dog means, disengaging said movable dog means and entering the path thereof to arrest said retrograde movement, and in a return stroke disengaging said fixed dog means, engaging said movable dog means and leaving said path, and a set of universal bars associated with said elements, each one of said universal bars being movable for operating its associated element.

11. In a variable spacing mechanism, an escapement member having teeth spaced apart a plurality of unit intervals of spacing and being urged in a letter-feed direction, a plurality of movable dogs normally engaged with said escapement member against said urging, movable dogs being mutually off-set by whole units of spacing, each movable dog comprising a guiding portion and an arresting portion, means mounting said movable dog means for engagement with and disengagement from said escapement member and shiftably mounting said movable dog means for said retrograde movement, and a set of elements selectively operable for in a single stroke engaging said guiding portion to rock said movable dogs and simultaneously entering the path of said arresting portion to arrest said retrograde movement, a plurality of normally disengaged fixed dogs for said escapement member, said fixed dogs being spaced apart one unit interval of spacing, a set of levers selectively rockable for in a single stroke cooperating with said guiding portion to disengage said movable dogs and simultaneously entering the path of said arresting portion to arrest said retrograde movement, and a universal member conditionable by said levers upon being rocked for in a forward stroke engaging said fixed dogs with said escapement member and in a return stroke disengaging said fixed dogs.

12. In a variable spacing mechanism, an escapement member having teeth spaced apart a plurality of unit intervals of spacing and being urged in a letter-feed direction, a plurality of movable dogs normally engaged with said escapement member against said urging, movable dogs being normally off-set by whole units of spacing, each movable dog comprising a guiding portion and an arresting portion, means mounting said movable dog means for engagement with and disengagement from said escapement member for a variable simultaneous retrograde movement counter to said direction, a plurality of movable dogs normally engaged with said escapement member against said urging, movable dogs being mutually off-set by whole units of spacing, each movable dog comprising a guiding portion and an arresting portion, means mounting said movable dog means for engagement with and disengagement from said escapement member and for a variable simultaneous retrograde movement counter to said
direction, a plurality of normally disengaged fixed dogs for said escapement member, said fixed dogs being formed of a plurality of adjacent levers spaced apart one unit interval of spacing and simultaneously rockable for engagement and disengagement with said escapement member, a set of selectively rockable adjacent levers spaced apart one unit interval of spacing and having a projection on each lever, the levers of said set being selectively rockable to cause the associated projections to cooperate with said guiding portion for disengaging said movable dogs and simultaneously to enter the path of said arresting portion to arrest said retrograde movement, and a universal member conditionable by any lever of said set upon being rocked for causing the levers of said plurality to alternate with said movable dogs in the engagement of said escapement member.

13. In a variable spacing mechanism as defined by claim 12, a common support for mounting said set of levers and said plurality of levers, and means for moving said support to shift said set and said plurality counter to said direction to increase said retrograde movement a constant extent.

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