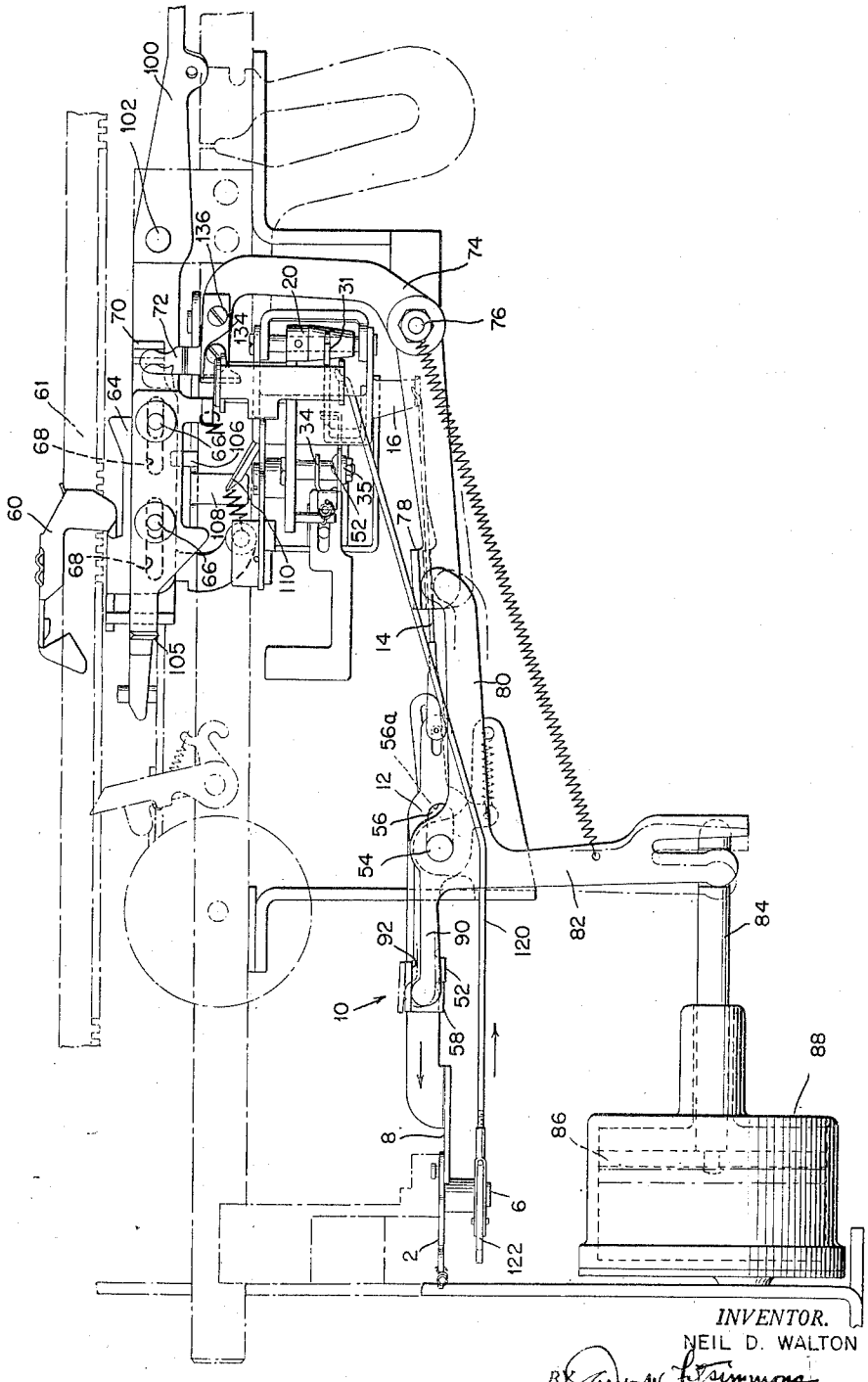
Jan. 7, 1958 N. D. WALTON 2,818,959

PAWL CONTROL

Filed Nov. 19, 1954 3 Sheets-Sheet 1

FIG. 1



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PAWL CONTROL

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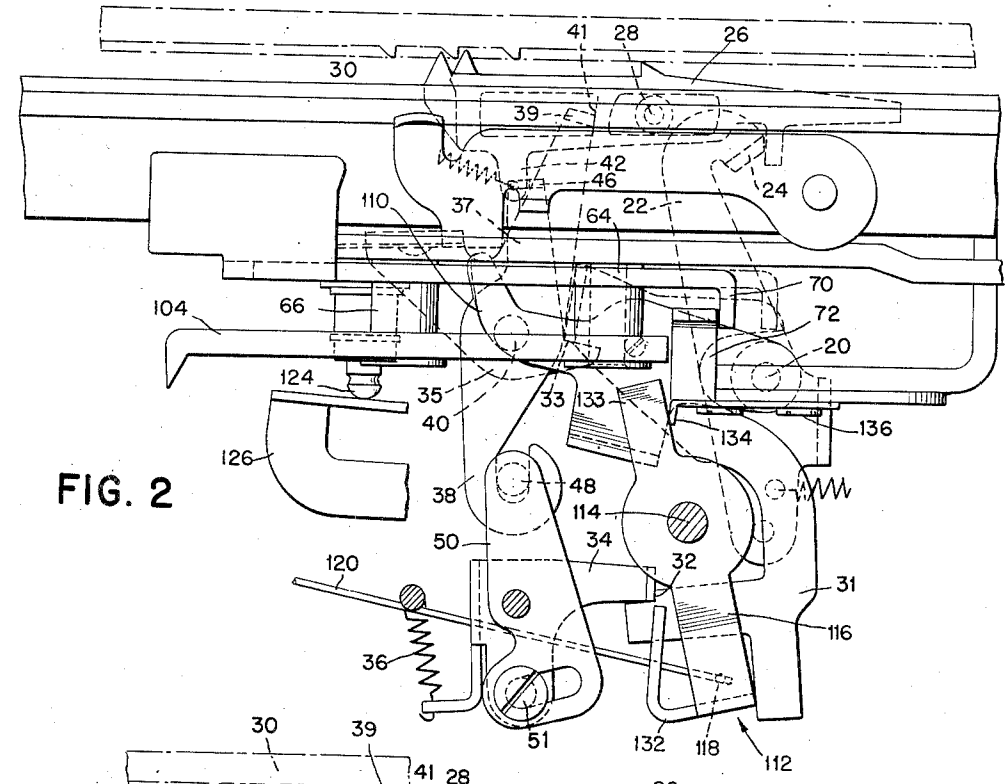


FIG. 2

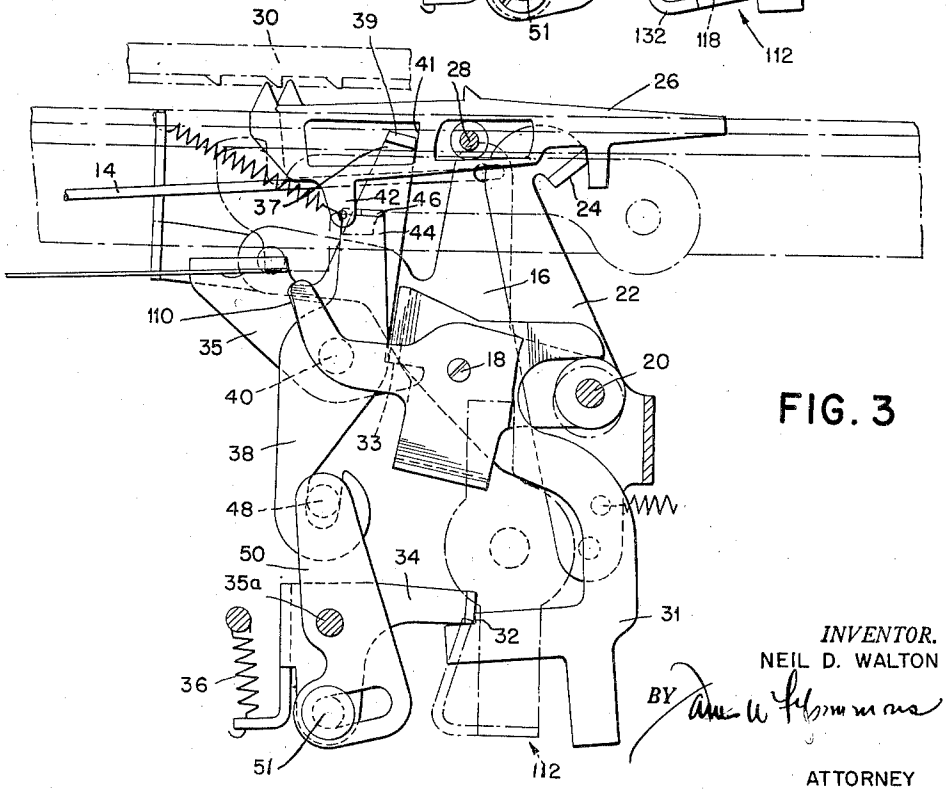


FIG. 3

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FIG. 4

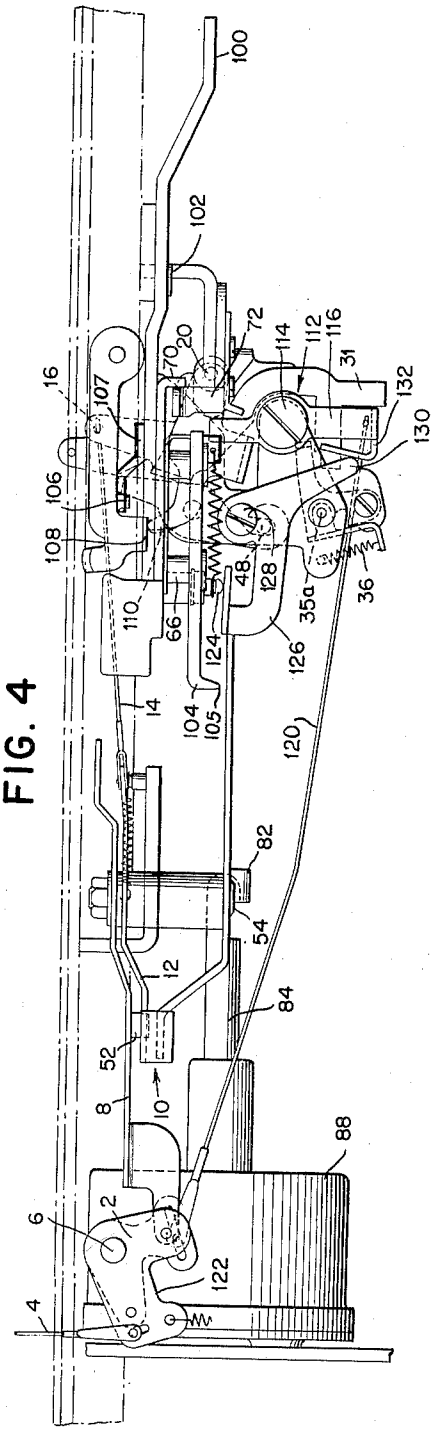


FIG. 6

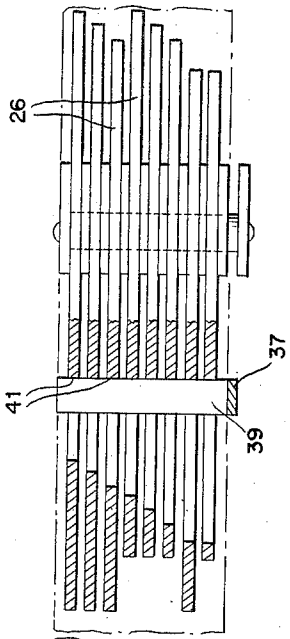
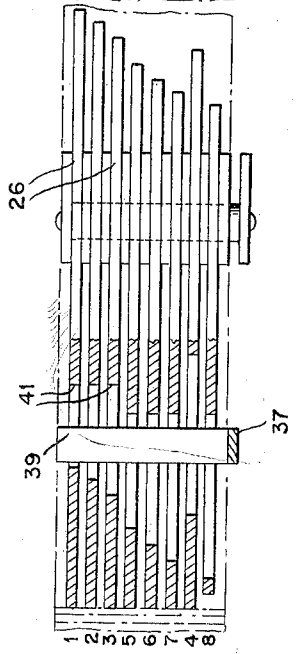


FIG. 5



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2,818,959

PAWL CONTROL

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Application November 19, 1954, Serial No. 469,870

6 Claims. (Cl. 197—94)

This invention relates to typewriters and more particularly to an improved escapement pawl control for a typewriter.

The operation of the IBM Executive model typewriter and particularly its escapement pawl mechanism for proportional spacing is shown in the United States Patent 2,547,449 to Dodge, while the carriage return mechanism is shown in United States Patent 1,955,614, and accordingly, reference is made to these patents to explain the background need for the present invention.

In Patent 1,955,614, it is shown that upon operation of a carriage return key lever, a clutch is energized which exerts a pull on a tension tape to return a carriage to the left hand margin position. During the carriage return movement, in order to reduce drag, the escapement pawls are lifted out of the rack and held out until the carriage comes to rest at the left hand margin position.

More specifically, it should be pointed out that when a typewriter carriage is returned to its left hand margin position, the carriage actually travels beyond the left hand margin by a slight amount known as overbank, and then returns to the exact position of the left hand margin.

Since the IBM Executive model typewriter has a plurality of escapement pawls, it is necessary to group them during a carriage return or a tabulating operation so that they will be in proper order to start a proportional escapement sequence. The need for the pawl grouping is spelled out in United States Patent 2,547,449.

During a repeat line spacing, when the carriage is in or is at the left hand margin position and moves only into overbank and then back to the left hand margin position, it sometimes happens that the pawls in being lifted out of the rack for the line space operation do not get back into the rack in proper grouped relationship whereupon the alignment of the left hand margin is destroyed.

Accordingly, it is a first object of this invention to provide an improved escapement pawl arrangement for assuring the proper left hand margin position of the typewriter carriage, irrespective of the number of repeat line spacing operations that the typewriter goes through.

It is a further object of this invention to provide an improved pawl grouping device for grouping the pawls each time the carriage return mechanism or tabulating mechanism is operated, and which grouping device will function at the left hand margin during repeat line spacing to assure proper pawl arrangement..

Modern typewriters are provided with air cylinders to reduce the shock of a carriage return. Because of the resistance offered by these air cushions, a carriage must be driven into the left hand margin position instead of coasting into position; therefore, it is a still further object of this invention to provide an improved clutch unlatching device which permits the carriage return clutch to drive the carriage all the way into the left hand margin position, before unlatching.

It is a still further object of this invention to provide a pawl latching and grouping device operable on a carriage return operation, and which will unlatch the pawls, dropping them back into the rack in grouped arrangement before the carriage reaches its left hand margin position.

It is a still further object of this invention to provide an improved carriage return control mechanism wherein the carriage return clutch mechanism is disabled by a tabular operation of the carriage at any stage of the carriage movement.

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 rear elevation of the operating components of an IBM Executive model typewriter.

Fig. 2 is a top elevation of the pawl mechanism in one poistion, and

Fig. 3 is a top elevation view of the pawl mechanism in another position.

Fig. 4 is a top elevation of the clutch release bell crank and the pawl latching mechanism, while

Figs. 5 and 6 are rear elevations of the escapement pawl mechanism of an IBM Executive typewriter.

Briefly, this invention relates to an improved pawl mechanism, wherein the escapement pawls are latched out of engagement with the escapement rack during a carriage return or tabular movement and wherein the escapement pawls are dropped back into the rack in grouped arrangement just before the carriage reaches the left hand margin position. The pawls will stay in the rack so long as carriage is within three or four letter spaces of the left hand margin irrespective of the number of carriage return operations, and the pawls will be grouped at each line spacing operation.

In the mechanism about to be described, provision is made first for latching the escapement pawls out of the escapement rack and holding them out until the carriage comes within one quarter inch of the left hand margin. At this position, the pawls will be released and dropped into the escapement rack and will stay there while the carriage continues the rest of the way through the left hand margin to an overbank position and back to the left hand margin position. The pawls will remain grouped in all of the travel until the carriage settles down at the left hand margin position at which time they will be released and assume their proper sequence position.

In order to provide for this operation, reference is made to Figs. 1 and 4 of the drawings, where a bell crank 2 is shown positioned for operation in response to a carriage return operation wherein a clutch (not shown) is engaged and exerts a pull on link 4 to rotate the bell crank clockwise about its pivot 6. This operation is fully explained in United States Patent 1,955,614 and co-pending application, Serial No. 469,915, filed November 19, 1954. The rocking of the bell crank 2 pulls on arm 8 which is connected through a latch 10 and an arm 12 to a link 14 which, in turn, is connected to an intermediate pawl release lever or bell crank 16. The latter is pivoted counterclockwise in Fig. 3 in response to clockwise rocking of bell crank 2 to pull the escapement pawls out of the escapement rack in the following manner: With reference now to Fig. 3 of the drawings, bell crank 16 is pivoted on pin 18 mounted on the typewriter frame. Bell crank 16 supports a pin 20 which is rockable about stud 18 in response to the rocking of the bell crank 16. More specifically, stud 20 supports an aligning or pawl release lever 22, having a tail portion 24 that pushes on pawls 26 to pivot them about their support 28 thereby disengaging them from the escapement rack 30. The stud 18 also carries an intermediate grouping lever 31, which is pivoted

in response to the rocking of the intermediate pawl release bell crank **16** acting through stud **20**.

The intermediate grouping lever **31** has a finger **33** engageable with a grouping lever **35** pivoted on a stud **40** and having an extension **37**, including a bent over finger **39** passing through corresponding openings in all of the pawls **26**.

Counterclockwise rotation of the intermediate grouping lever **31** about supporting stud **18**, as a result of rocking of stud **20**, rotates the grouping lever **35** clockwise causing the finger **39** to push the corresponding edges 41 of all the pawls **26** into grouped position (see Figs. 5 and 6). Intermediate grouping lever **31** further has a catch portion **32** engageable with a grouping latch **34**, after intermediate grouping lever **31** has been rotated counterclockwise to the position shown in Fig. 3, whereupon a spring **36** pulls on the latch **34** thereby pivoting it about its support **35***a* into locking engagement with the catch portion **32**. This latching operation holds the pawls grouped and retains them in grouped position, as shown in Fig. 6, so that the proper pawl will engage the assigned rack tooth for a proportional escapement operation. As will be explained in greater detail, the pawls will be latched in grouped position, while the carriage moves through the left hand margin into overbank and settles down at the left hand margin. As the carriage moves from overbank into the left hand margin position, one of the pawls will strike the assigned rack tooth, which in turn, will push on the pawl to release the grouping latch, whereupon the pawls will be in their proper sequence position for a proportional escapement operation, and the carriage will be at the correct left hand margin position. The pawls are unlatched as follows: An unlatching lever **38** is pivotally mounted on stud **40** carried by the typewriter frame in position to be rocked by an ear 42 of the pawls. More particularly, the pawl engaging end 44 of unlatching lever **38** is bent over to provide a lip **46** long enough to engage only the ear **42** on either the number 4 or 8 pawl, the shortest pawl, respectively, of each of the two groups described in the aforementioned Dodge Patent 2,547,499. These pawls are juxtapositioned as shown in Fig. 5 and 6, and either pawl in engaging a rack tooth will unlatch the grouping latch **34** and position the pawls in proper sequence in the rack (Fig. 5). The ear 42 of the 4 or 8 pawl in engaging the lip **46** will rock the release lever **38** clockwise (Fig. 3) about its pivot **40**, whereupon the release lever will pull on a pin **48** carried by a latch release arm **50** to rotate the latter counterclockwise about its supporting pivot **35***a*. Latch release arm **50** is adjustably connected by a set screw arrangement **51** to the grouping latch **34**. Accordingly, when either the 4 or 8 pawl pushes on the lip **46** to rock the unlatched lever **38** clockwise, the trip latch **34** will be rocked counterclockwise, thereby disengaging the latch from the shoulder **32** thus permitting the pawls to become ungrouped, and assume their Fig. 5 position.

It has been previously mentioned that a pull on link **8** (Figs. 1 and 4) will hold the pawls out of the escapement rack and latch them out and in grouped position. The pawls should be dropped back in the rack in grouped arrangement within approximately a quater of an inch of the left hand margin. This action is accomplished in the following manner: Referring specifically to Fig. 1 and Fig. 4, it will be noticed that the arm **8** carries a latch ear 52 and that it is mounted by means of an elongated aperture **56** for sliding movement on a stud **54** (carried by the typewriter frame). The arm **12** is also slidably mounted on the stud **54** within the limits of its elongated aperture **56***a* and the arm has a complementary hook portion **58** engageable with ear **52** of arm **8** to form the latch **10**. The pull on link **14** in response to clockwise pivoting of bell crank **2** takes place only when the ears **52** and **58** are in engagement. If this latch connection is broken, the arm **12** will move to the right to the position shown in

Fig. 1 so that the left hand end of aperture **56***a* is in engagement with the stud **54**. This position of arm **12** will release the pull on link **14** thereby permitting the pawls to drop back into engagement with the escapement rack. In accordance with the teachings of this invention, the arm **12** is rocked clockwise about the pivot stud **54** when the carriage reaches a position within a quarter of an inch of the left hand margin, thereby releasing the ear **52** from **58** permitting the link **14** to be released so that the pawls will be dropped back into the escapement rack.

In this respect, the carriage is provided with a movable margin stop **60**, which is adjustable on margin rack **61** to determine the margin position. When the carriage is moved towards the left hand margin position, which will be from right to left in Fig. 1, the carriage margin stop **60** will come into contact with the margin lever **64** which is slidably mounted on the typewriter frame by means of the studs **66** and elongated apertures **68**. The margin lever includes an ear **70** engageable with a finger **72**, an integral part of a margin control lever **74**, which is pivotally supported at **76** on the typewriter frame. The margin control lever **74** in turn has an operating ear **78** engageable with an air cushion bell crank **80** which is pivoted on stud **54** and has an actuating arm **82** for pushing on a rod **84**, that carries a piston **86** of an air cylinder **88**. With this structure, when the carriage moves into the left hand margin position, the finger **72** is moved counterclockwise about its supporting stud **76** by margin lever **64** thereby actuating the air cylinder **88** to absorb the shock of the carriage. Simultaneously, the air cylinder arm **80** which has an integral portion, an unlatching lever **90**, is rocked clockwise about the stud **54** thereby acting upon an ear **92** to disengage the ear **52** from the hook **58** unlatching the arm **12** so the tension is taken off the link **14** whereupon the pawls are allowed to drop back into the escapement rack. It will be noted that this latter operation takes place within the time and distance that it takes the carriage to travel the difference between the elongated aperture **68** and the stud **66**.

Starting from the depression of the carriage return button, the escapement pawls will be latched out of the escapement rack and grouped until the carriage returns within a quarter of an inch of the left hand margin position whereupon the operation of the margin stop in conjunction with the finger **72** will unlatch the arm **12** to release the tension on link **14** thereby permitting the pawls to drop back into the escapement rack but holding the pawls grouped and latched in the grouped position. The pawls will stay in the grouped position until the carriage has passed the left hand margin into the overbank position and back to the left hand margin again, at which time they will be ungrouped, and assume the position shown in Fig. 5.

Tabulation

As is more particularly described in United States Patent 1,935,436, a tabulation operation is instituted by a power cam operating in conjunction with the power roll and pushing on a bell crank to exert a force into the plane of the paper (as viewed in Fig. 1) against a tab lever **100**. The latter is pivotally mounted for clockwise and counterclockwise movement as viewed in Fig. 1 about the stud **102**, so that the nose **105** of a tab check lever **104** (mounted on tab lever **100** by means of studs **66**), Figs. 1 and 4, is movable counterclockwise and latched in a tab checking position as described in aforesaid Patent 1,935,436, when the tabulating mechanism is operated. This counterclockwise motion of tabulating lever **100** (acting through integral extension **107**), Fig. 4, exerts a force on a finger **106** and consequently, on an ear **108** which, in turn, is in contact with an extension **110** (see Figs. 2 and 3 also) of the intermediate pawl release bell crank **16** which has been previously mentioned as being pivoted on the stud **18**. This push

on the finger **110** will rock the intermediate pawl release bell crank about the stud **18** to exert a thrust on stud **20** thereby grouping the pawls **26** through the mechanism previously described and rocking the intermediate grouping lever **31** so that the grouping latch will engage the shoulder **32** thereby holding the pawls in grouped arrangement until they are unlatched by the 4 or 8 pawl striking a tooth in the escapement rack as has heretofore been described.

When the nose **105** of the tab check lever **104** strikes a tab stop, the tab lever will be unlatched as described in United States Patent 1,935,346, whereupon the tab lever is restored to its Fig. 4 position. With the restoring of the tab lever, the ear **108** is removed from the path of the finger **110** so that the pawls will drop back into the rack; but it will be noted that the pawls will still be grouped and latched by the inter-action of the grouping latch **34** and the shoulder **32**. This grouping of the pawls will exist until the 4 or the 8 pawl strikes the proper tooth on the escapement rack to unlatch the grouping latch as has heretofore been described. It is important to note that with the mechanism shown, the pawls are grouped and latched in the grouped position both for a carriage return operation and during a tabulation run, and consequently, it is apparent that for any carriage movement with the pawls grouped and latched in the grouped position, the pawls will always be unlatched and arranged in their proper sequence for a proportional spacing operation by the 4 or 8 pawl butting against a tooth of the escapement rack.

The tabulation will override the carriage return operation

Referring to Fig. 2 of the drawings, an automatic grouping lever **112** is shown mounted for pivotal movement about a stud **114** carried by the typewriter frame. The automatic grouping lever **112** has an outer arm **116** which is provided with an aperture **118** for housing a pull link **120** which is also shown in Fig. 1 of the drawings. Pull link **120** is connected to a bell crank **122**, which is mounted on the stud **6** to be movable independently of the bell crank **2**. It will be noted that counterclockwise rotation of the automatic grouping lever **112** about its supporting stud **114** will exert a pull on the link **120** opposite in direction from the pull exerted on the arm **8** when the bell crank **2** is operated by the carriage return mechanism (see arrows). As shown in copending application, Serial No. 469,915, filed November 19, 1954, the pull to the right in Fig. 1 of the drawings on link **120** will disable the carriage return mechanism to the extent that the clutch will be prevented from latching up. In addition, if the carriage return clutch has been operated and latched, then the pull on link **120** will unlatch the carriage return clutch.

With reference to Figs. 2 and 4 of the drawings, the tab lever **100** includes an integral button **124** which is rotated counterclockwise during a tab operation as heretofore described. A bell crank **126** is positioned on a stud **128** for engagement with the button **124** so that during a tab operation, the bell crank **126** will be rocked counterclockwise about the stud **128** whereupon an extension **130** (Fig. 4) will engage an ear **132** carried by the automatic grouping lever **112**. With this operation, it is obvious that every time the tabulating mechanism is set, the inter-engagement of the extension **130** and the ear **132** will rock the automatic grouping lever **112** counterclockwise about its supporting stud **114** thereby exerting a pull on link **120** in the direction of the arrow shown in Fig. 1 so as to disable the carriage return clutch latch to prevent the carriage return clutch from latching up during a tabulating run.

A grouping operation for a manual carriage return

Referring to Fig. 2, it will be noticed that the automatic grouping lever **112** has an extension **133** which is positioned for engagement with a finger **134** carried by the margin control lever **74** (see Fig. 1).

Referring now to Fig. 1 of the drawings, it will be noted that as the carriage is moved to the left hand margin position, the margin stop **60** engages the margin lever **64** which is axially slidable within the limits of the difference between the apertures **68** and the studs **66**. It has been mentioned how the margin lever **64** carries an ear **70** which operates on the finger **72** to rotate the margin control lever **74**. The finger **134** is secured by screws **136** to the margin control lever **74**. Accordingly, as the carriage moves into a left hand margin position, the finger **70** rotates the margin control lever **74**, whereupon the finger **134** will push on the extension **133** of the automatic grouping lever thus causing its outer end **116** to push upon the intermediate grouping lever **31** rocking that counterclockwise about its supporting stud **18** as has heretofore been described.

The counterclockwise rotation of the intermediate grouping lever **31** causes the finger **33** to rotate the grouping lever **35** clockwise to group the pawls and also causes the grouping latch **34** to engage the shoulder **32** on the intermediate grouping lever **31**. Accordingly, by the mechanism described, as the carriage is pulled manually into the left hand margin position, the pawls will be grouped and latched in the grouped position until the carriage is released and allowed to settle at the left hand margin. In doing this, the 4 or 8 pawl will engage the assigned rack tooth and unlatch the grouping latch **34** permitting the pawls to assume their ungrouped position, shown in Fig. 5.

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 typewriter having a power operated carriage return mechanism and an escapement pawl spring biased into releasable engagement with a typewriter escapement rack for effecting an escapement operation, a pawl control device for lifting said escapement pawl out of the escapement rack during a carriage return operation and for holding said escapement pawl out until the carriage reaches a predetermined distance from its left hand margin position, said pawl control device comprising a bell crank, means pivotally mounting the same on the typewriter frame for rocking movement from an inoperative to an operative position in response to a carriage return operation, an escapement pawl release lever mounted on said typewriter frame for movement into and out of a position to lift said pawl out of said escapement rack in opposition to said spring biasing means, and actuating means for moving said pawl release lever into its lifting position comprising a two piece link interconnecting said bell crank and said pawl release lever, a releasable latch in said link normally interconnecting said two link pieces, and adjustable means operable in response to the movement of the carriage toward its left hand margin position for releasing said latch to disengage said pawl release lever from said bell crank thereby permitting said pawl to drop back into said escapement rack irrespective of the position of said bell crank.

2. In a typewriter having a power operating carriage return mechanism and an escapement pawl spring biased into releasable engagement with a typewriter escapement rack for effecting an escapement operation, a pawl control device for lifting said escapement pawl out of the escapement rack during a carriage return operation and for holding said escapement pawl out until the carriage reaches a predetermined distance from its left hand margin position, said pawl control device comprising a bell

crank, means pivotally mounting the same on the typewriter frame for rocking movement from an inoperative to an operative position in response to a carriage return operation, an escapement pawl release lever mounted on said typewriter frame for movement into and out of a position to lift said pawl out of said escapement rack in opposition to said spring biasing means, and actuating means for moving said pawl release lever into its lifting position comprising a two piece link interconnecting said bell crank and said pawl release lever, a releasable latch in said link normally interconnecting said two link pieces, and adjustable means operable in response to the movement of the carriage toward its left hand margin position for releasing said latch to disengage said pawl release lever from said bell crank thereby permitting said pawl to drop back into said escapement rack irrespective of the position of said bell crank, said latch releasing means comprising a margin lever pivotally mounted on said typewriter frame for movement into and out of an operative position as said carriage approaches its left hand margin position, and means interconnecting said margin lever and said link latch to release the latter as said carriage approaches its left hand margin position.

3. In a typewriter having a power operated carriage return mechanism and an escapement pawl spring biased into engagement with an escapement rack for effecting an escapement operation, a pawl control device for releasing said escapement pawl from the carriage escapement rack during a carriage return operation and for holding said pawl released until the carriage reaches a predetermined number of letter spaces before the left hand margin position and for holding the escapement pawl in the rack so long as the carriage is within a predetermined number of letter spaces from the left hand margin position, said pawl control device comprising a pawl release lever pivotally mounted on the typewriter frame for movement into and out of a position for releasing said escapement pawl from the carriage rack in opposition to the pawl biasing means, a bell crank pivotally mounted on said typewriter frame and rockable in response to a carriage return operation from a rest position to a latched position, a two piece link device including a latch normally holding said two pieces in engagement interconnecting said bell crank and said pawl release lever whereby during a carriage return operation when the bell crank is rocked to its latched position said link device pulls on said pawl release lever to pivot the same and release the escapement pawl from the escapement rack, a margin lever pivotally mounted on said typewriter frame for rocking movement in response to the typewriter carriage moving through a predetermined number of letter spaces before its left hand margin position, and a latch trip arm interconnecting said margin lever with said link latch to release the latter to disconnect said pawl release lever from said bell crank thereby permitting said escapement pawl to drop back into the escapement rack irrespective of the of the latched condition of said bell crank, said trip arm preventing said link latch from interconnecting the two pieces of said link so long as the carriage is within said predetermined number of letter spaces from the left hand margin position.

4. In a typewriter having a power operated carriage return mechanism and a plurality of pawls engageable with the escapement rack for a proportional escapement operation, a device for grouping the plurality of pawls during a carriage return operation and latching them in grouped position until the carriage stops at an assigned position, said device comprising a pawl grouping lever pivoted on said typewriter frame, means operable in response to a carriage return operation for rocking said grouping lever from a rest position to a grouping position to group said pawls, a latch for locking said grouping lever in pawl grouping position after said plurality of pawls have been grouped, a grouping latch release, and means operable in response to a predetermined pawl striking an assigned rack tooth to operate said grouping latch release to ungroup said pawls.

5. In a typewriter having a power operated tabulating mechanism and a plurality of pawls engageable with an escapement rack for effecting a proportional escapement operation, a device for grouping the plurality of pawls during a tabulation run of the carriage and latching them in grouped position until the carriage stops at an assigned position, said device comprising a pawl grouping lever pivotally mounted on the typewriter frame to group the pawls as said grouping lever is pivoted into a grouping position, means operable in response to a tabulating operation for rocking said grouping lever from a rest position to a grouping position to group said pawls, a latch for locking said grouping lever in pawl grouping position after said pawls have been grouped, a grouping latch release, and means operable in response to a predetermined pawl striking an assigned rack tooth to operate said latch release to ungroup said pawls.

6. In a typewriter having a power operated carriage return mechanism and a plurality of pawls engageable with an escapement rack to effect a proportional escapement operation, a device for releasing the pawls from the escapement rack during a carriage return operation and for dropping the pawls back into the rack in a grouped relationship before the carriage reaches a left hand margin position, said device comprising a pawl release lever pivotally mounted on the typewriter frame for rocking movement from a rest position to a pawl releasing position, a bell crank pivotally mounted on said typewriter frame for movement into a latched position in response to a carriage return operation, a two piece link device including a link latch for holding the link parts normally in assembled relationship to interconnect said bell crank and said pawl release lever thereby rocking the latter to a pawl releasing position during a carriage return operation, a grouping lever pivotally mounted on said typewriter frame for rocking movement into a pawl grouping position in response to the rocking of said pawl release lever, a latch for locking said pawl grouping lever in pawl grouping position after said pawls have been grouped, a link latch release, a margin lever pivotally mounted on said typewriter frame to be rocked in response to the carriage traversing a predetermined number of letter spaces before the left hand margin position, a trip lever interconnecting said margin lever and said link latch whereby said link latch is released to permit said pawls to drop back into their escapement rack in response to the rocking of said margin lever, a grouping latch release, and means operable in response to a predetermined pawl striking an assigned rack tooth to operate said grouping latch release to ungroup said pawls.

References Cited in the file of this patent

UNITED STATES PATENTS

2,258,116	Khalil	Oct. 7, 1941
2,315,992	Von Reppert	Apr. 6, 1943