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

In the prior art, proportional escapement typewriters, such as shown in U.S. Patent 2,547,449, Dodge, the plural escapement pawls are selectively tripped via interposers which are mounted in a cage that is resiliently held in a rest position determined by a fixed point on a typewriter frame. With this structure, it was necessary for the typewriter carriage to come to a complete stop before an escapement action in order to insure the tripping of the proper pawl pattern. To meet this requirement, the rate of escapement cycles necessarily must be relatively low.

It is a first object of this invention, therefore, to provide an improved interposer mounting arrangement for a proportional escapement typewriter.

It is a further object of this invention to provide an improved interposer arrangement for a proportional escapement typewriter whereby the typewriter may be operated at a higher rate of escapement cycles without misspacing.

It is a still further object of this invention to provide an improved interposer arrangement for a proportional escapement typewriter whereby correct spacing will occur irrespective of the bounce and rebound of the typewriter carriage.

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 a portion of a typewriter action.
Fig. 2 is a plan view of an interposer and pawl arrangement in a normal condition.
Fig. 3 is a front elevation of the interposer and pawl arrangement in the normal condition.
Fig. 4 is a plan view of the interposer and pawl arrangement in an expanded condition.
Fig. 5 is a front elevation of the interposer and pawl arrangement in an expanded condition.
Fig. 6 is a side elevation of a portion of the interposer cage arrangement.

Briefly, this invention relates to an improved interposer-pawl arrangement wherein the interposer rest position is always fixed relative to the escapement pawls, rather than to a point on the typewriter frame, and therefore, a correct pawl selection can be made even though the carriage might be in flight.

With reference to the drawings, particularly Fig. 2, a carriage rack 2 is illustrated as being spring biased to the left by a spring motor (not shown). Conventionally, the rack is escaped in steps by tripping some combination of a group of pawls 4 of varying effective length. Under influence of springs 5, the tripped pawls are skipped over one rack tooth and into holding engagement with the next one. The tripping action of the pawls in turn is controlled by an escapement trip lever 6 which is pivotal about a shaft 8 so that its leading edge 10 acts on a selected one of a group of interposers generally indicated as 12 to rock the same about its supporting pivot pin 13 to provide carriage escapement.

With reference to Fig. 1, the escapement trip lever 6 is illustrated as being operative in response to a type bar being driven into printing position. The type bar 18 in turn is driven by a well known IBM type bar drive mechanism wherein a cam lever 20 is pivotally supported for actuation by a conventional power roll (not shown). When a key lever 24 is depressed, it acts on a trip latch 26 which is pivotally supported on cam lever 20 to push a cam 28 into engagement with the power roll thereby initiating a type bar print stroke.

In a proportional escapement typewriter such as explained in the above cited Dodge Patent 2,547,449, each cam lever carries a selector bar 30 having selector fingers 32 (a different combination for each type bar) arranged thereon to actuate one of a group of selector bails 34. The bails in turn operate individual actuating levers 36 which, acting through links 38, rock respective interposer bell cranks 40 about their pivot 42. The pivot 42, the escapement trip lever 6, and the interposers 12 are mounted on a bracket 44 which, in turn, is mounted on the typewriter frame. Formed in the upper arms of the bell cranks 40, as shown in Fig. 1, are forked portions engaging flanges on the lower ends of the interposers 12.

Each interposer is provided with an elongated vertical slot, not shown, through which the pin 13 extends. The rocking of a bell crank 40 in a counter-clockwise direction lifts a selected interposer 12 relative to the pin 13 and into the path of the leading edge 10 of the escapement lever 6 which rocks the interposer forwardly against the action of a spring 45. The lever 6, of course, is actuated as the type bar approaches print position, and accordingly, an escapement action is provided which is individual to each type bar.

Basically, with reference to Figs. 2 and 3, a plurality of pawls 4-1 through 4-5 are shown as each having a nose 46 engageable with the teeth of the rack 2 and a half 48 which is acted upon by the interposers 12. Each pawl further has a slot 50 which is mounted over a pawl pivot pin 14. When the nose 46 of a pawl is in engagement with the rack 2 while the right hand end of the slot 50 is in engagement with the pawl pivot pin 14, then the rack will be stopped by that pawl. The distance between the nose of each pawl and the right hand end of its slot 50 is one unit greater or less than the next adjacent pawl in the series. Admittedly, the pawl arrangement shown is only one of many combinations of arrangements, but a corresponding step arrangement can be found in any position that the rack is stopped. As stated above, a complete description of this proportional escapement action is described in U.S. Patent 2,547,449, Dodge.

The principal feature of this invention lies in the mechanism for locating the interposers 12 relative to the tails of the pawls 4, so that the interposers always follow the pawls and are in position to actuate the proper pawls irrespective of the displacement of the carriage relative to its correct stopping position. In other words, proper pawl selection will occur on each type bar print stroke irrespective of carriage movement, speed or bounce.

To accomplish this, the interposers are all fixed against lateral movement relative to one another in a cage 56 but are permitted relative parallel sliding movement in response to the rocking of their individual interposer bell cranks 40. Actually, only the interposers 12-3, 12-4, 12-5 are selectively controlled by corresponding inter-
poser bell cranks 40-3, 40-4, 40-5, and the 12-2 interposer is actuated at each type bar print stroke. The cage 56 is slantly mounted on the shaft 8 and pin 13 and is movable transversely under the influence of a spring 54 which is in the rear portion of the typewriter frame. The spring 54 biases the interposer cage 56 against the tail of the pawl 4 which extends out the furthest to the left (actually the holding pawl). Accordingly, when a group of pawls are tripped in an escapement action so that their springs 5 pull them over the next rack tooth, the spring 54 diametrically biases the interposer cage into engagement with the tail of the nearest pawl, i.e. the one which will stop the rack. Since the pawl cage has a relatively light mass, it can be appreciated that the cage will be in proper index with the pawl's long before the carriage comes to rest, and the spring 54 will hold the cage 56 in index with the pawls irrespective of carriage bounce, etc.

This arrangement of parts as determined by tests, has proved conclusively that a much higher rate of typing cycles can be performed while maintaining a proper pawl selection.

**Expand**

Under some instances, a typist desires to have additional units of escapement between characters. One mechanism for effecting this result is shown in the Dodge Patent 2,547,449. In the subject invention however, an improved expand mechanism is provided. More specifically, an expand interposer 12-e is positioned between the 12-2 interposer and the wall of the cage 56. When the expand interposer 12-e is in its normal position, i.e., swung forwardly in Fig. 1 about its pivot 13 until it engages a stop pin 57, the spring 54 will index the cage 56 so that expand interposer 12-e is against the tail of the holding pawl, as shown in Figs. 2 and 3. However, for an expand operation, as shown in Figs. 4 and 5, the expand interposer 12-e is removed and then spring 54 maintains the inner surface of cage 56 in index with the tail of the holding pawl. It can be appreciated, therefore, that the pawl tails will extend one additional unit into the path of the interposers. That is, while the number 2 interposer in a normal condition tripped only the number 1 and 2 pawl, it will in the expand condition trip the numbers 1, 2, and 3 pawls, thereby providing three units of escapement rather than the normal two units, etc.

The control of the expand interposer 12-e is effected through link 58 which is connected between a control button 60 pivotally supported on the typewriter cover and an expand lever 66 carried by bracket 44.

With reference to the expand mechanism, it is apparent from a comparison of Figs. 2 and 4, that if a change is made from an expand position to a normal position, that the interposer 12-e must be moved from its Fig. 4 to its Fig. 2 position. However, if this were done directly, it would trip the tail of the one unit pawl, and accordingly there would be an unwanted single unit of escapement. In order to prevent this, provision is made to rock the interposer cage 56 to the left as viewed in Fig. 4, and out of engagement with the tails of the pawls while the interposer 12-e is moved into its Fig. 2 position.

This is accomplished by providing camming projection 64 on the side of the interposer cage 56. In order to utilize this camming mechanism and also to move the 12-e interposer into and out of active position, the expand lever is provided with a finger 68, Fig. 1, which engages the camming surface 64 when the expand lever is rocked. The lever 66 is also provided with a bent end portion 69, Fig. 6, which acts against a cam surface 65 on the interposer 12-e as moving the latter rearwardly out of the path of the pawls 4 when the lever is rocked in a counterclockwise direction. At the same time, the finger 68 acts on the cam projection 64 to move the cage clear of the pawls, and the end portion 69 on the lever is moved away from the cam surface 65 so that a spring 74, Fig. 6, can swing it forwardly to the position of Fig. 2. An arm 70 between the interposer cage 56 and the escapement lever 44 actuates a depressing 73 slantly mounted on the pin 13 and engaging the left hand side of the cage 56 in Fig. 1. On the arm 70, as shown in Fig. 6, is a finger 73 and an offset portion 75 cooperating with the bushing for holding the lever 66 in the position shown.

When the lever is rocked in a counterclockwise direction the opposite side of the escapement lever 44, another finger 76 and the portion 75 act on the bushing for holding the lever. The cage is continuously urged against the arm 70 by a spring 77, Fig. 1, mounted on the pin 13.

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 type bar, selectively controlled means for driving the same to printing position, a carriage biased normally in character spacing direction, a plurality of pawls operable to control the escapement of said carriage with only one of said pawls at a time being the holding pawl, a plurality of interposers for movement in parallel juxtaposition with respect to one another and with respect to a surface on said carriage with only one of said pawls at a time being the holding pawl, a plurality of interposers selectively settable in response to a type bar print stroke to determine the number of pawls to be tripped, and interposer drive means responsive to said type bar print stroke for driving said set interposers into engagement with predetermined ones of said pawls to trip the same and thereby control carriage escapement, an improved device for maintaining a predetermined indexing relationship between said interposers and said pawls irrespective of said carriage movement comprising a cage for holding all of said interposers for movement in parallel juxtaposition with respect to one another and with respect to a surface on said carriage from a rest position to a set position, said surface having indexing engagement with said pawls when said interposers are in rest or set positions, and spring means biasing said cage toward said pawls.

2. In a typewriter having a type bar, selectively controlled means for driving the same to printing position, a carriage biased normally in character spacing direction, a plurality of pawls operable to control the escapement of said carriage with only one of said pawls at a time being the holding pawl, a plurality of interposers selectively settable in response to a type bar print stroke to determine the number of pawls to be tripped, and interposer drive means responsive to said type bar print stroke for driving said set interposers into engagement with predetermined ones of said pawls to trip the same and thereby control carriage escapement, an improved device for maintaining a predetermined indexing relationship between said interposers and said pawls irrespective of said carriage movement comprising a cage for holding all of said interposers for movement in parallel juxtaposition with respect to one another and with respect to a surface on said carriage from a rest position to a set position, said surface having indexing engagement with said pawls when said interposers are in rest or set positions, and spring means biasing said cage toward said pawls.

3. In a typewriter having a type bar, selectively controlled means for driving the same to printing position, a carriage biased normally in character spacing direction, a plurality of pawls operable to control the escapement of said carriage with only one of said pawls at a time being the holding pawl, a plurality of interposers
selectively settable in response to a type bar print stroke to determine the number of pawls to be tripped, and interposer drive means responsive to said type bar print stroke for driving said set interposers into engagement with predetermined ones of said pawls to trip the same and thereby control carriage escapement, an improved device for maintaining a predetermined indexing relationship between said interposers and said pawls irrespective of said carriage movement, comprising a cage for holding all of said interposers for movement in parallel juxtaposition with respect to one another and with respect to a surface on said cage from a rest to a set position, said surface arranged in a position for indexing engagement with said pawls when said interposers are in rest or set positions, spring means biasing said cage toward said pawls, and an expand device comprising an expand interposer positioned proximate said cage surface and movable to a position between the latter and said pawls thereby changing the relative indexing position between said cage and said pawls.

4. In a typewriter having a type bar, selectively controlled means for driving the same to printing position, a carriage biased normally in character spacing direction, a plurality of pawls operable to control the escapement of said carriage with only one of said pawls at a time being the holding pawl, a plurality of interposers selectively settable in response to a type bar print stroke to determine the number of pawls to be tripped, and interposer drive means responsive to said type bar print stroke for driving said set interposers into engagement with predetermined ones of said pawls to trip the same and thereby control carriage escapement, an improved device for maintaining a predetermined indexing relationship between said interposers and said pawls irrespective of carriage position comprising a cage for holding all of said interposers for movement in parallel juxtaposition with respect to one another and with respect to a surface on said cage, said surface arranged in a position for indexing engagement with said pawls when said interposers are in rest or set positions, a predetermined one of said interposers being maintained in set position during each type bar print stroke and always acting to trip the holding pawl, spring means biasing said cage toward said pawls, an expand device comprising an expand interposer positioned proximate said surface, manual means for moving the same into and out of an indexing position between said pawls and said surface thereby changing the relative indexing relationship between said cage and said pawls, and cam means actuated by said manual means to displace said cage surface away from said pawls while said expand interposer is being moved into and out of indexing position.

References Cited in the file of this patent

UNITED STATES PATENTS

2,547,449 Dodge ----------------- Apr. 3, 1951