Nov. 6, 1951 W. J. ZENNER 2,574,137

STOP FOR RECIPROCATING MEMBER

Filed March 22, 1946

FIG. 1

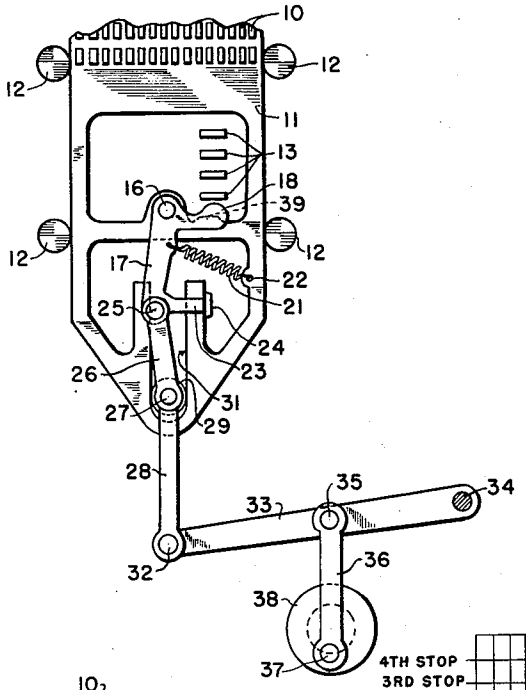


FIG. 2

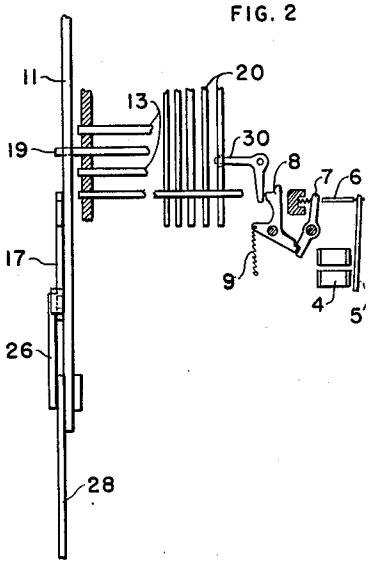


FIG. 3

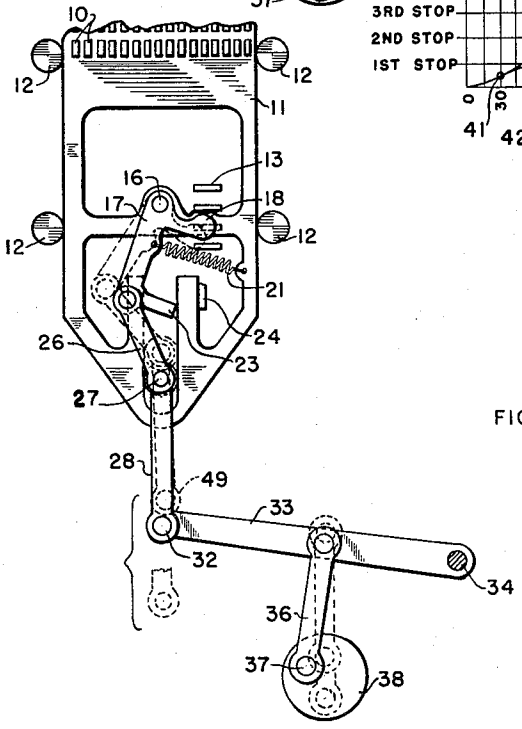


FIG. 5

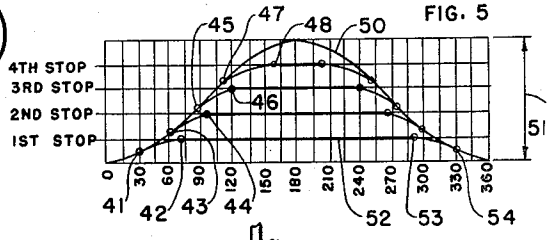


FIG. 4

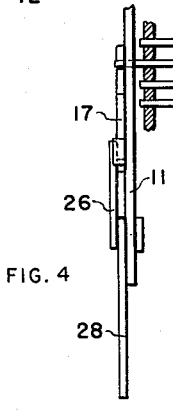
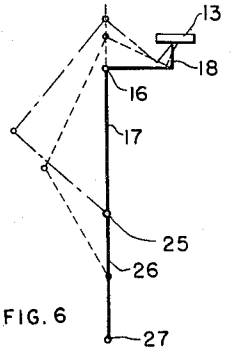


FIG. 6



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STOP FOR RECIPROCATING MEMBERS

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Application March 22, 1946, Serial No. 656,284

7 Claims. (Cl. 192—143)

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The present invention relates to mechanical movements and more particularly to a toggle or knee-action driving device.

The primary object of the invention is to provide means for translating a movement of fixed extent into a movement of variable extent.

Another object of the invention is to provide a mechanical movement comprising an eccentric and toggle for translating the fixed or invariable movement of the eccentric carried on a drive shaft into the variable accelerating and decelerating movement of a member to be moved.

Specifically, the proposed arrangement according to the present invention contemplates a vertical selection of type rows under the control of a knee-action linkage or toggle connection of novel design between the drive shaft and type carrier. The utility of the toggle or knee-action drive resides in the provision of a compensating means for the fixed and invariable movement of the eccentric carried on the drive shaft, and the variable vertical movement of the type carrying frame. A feature of the invention resides in providing means for smoothly accelerating and decelerating the movement of the type carrier so that the latter comes to rest gently against a selected stop bar, and conversely, gains speed smoothly as it leaves the stop.

For a more complete understanding of the foregoing objects and features of the invention, reference may be had to the following detailed description which is to be interpreted in the light of the accompanying drawings wherein:

Fig. 1 is a front elevational view of the mechanical movement according to the present invention in its normal position;

Fig. 2 is a side elevation of the arrangement shown in Fig. 1;

Fig. 3 is a front elevational view of the mechanical movement in its operated position;

Fig. 4 is a side view of the arrangement shown in Fig. 3;

Fig. 5 is an illustration showing graphically the motion of the reciprocating member; and

Fig. 6 is a diagrammatic illustration of the mechanical movement according to the present invention.

Having reference to the drawings, there is shown in Fig. 1 a member 11 to be moved which is guided in its movement by a series of guide elements 12. In one embodiment of the invention the member 11 carries a series of type elements 10 arranged in a plurality of horizontal rows, for example, four rows. The extent of movement of the member 11 in one direction is

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governed by a blocking means comprising a series of selectable stop bars 13 (four in the present embodiment). As illustrated in Fig. 2 the selectable stop bars 13 are selectably operated by a signal responsive selector mechanism of the form shown in Krum Patent No. 1,665,594. Briefly, the selector mechanism according to this patent is indicated schematically in Fig. 2 by a selector magnet 4, which is one of a set of selector magnets the number of which depends upon the particular code used. For example, if a five unit code is used, five magnets 4 are employed, one for each impulse of the code. Associated with each magnet 4 is an armature 5 which controls a plunger member 6 which is adapted to operate a latch member 7. The latch member 7 when operated by the plunger 6 in a counterclockwise direction (as viewed in Fig. 2) upon the energization of magnet 4 in response to a code impulse, acts to trip a bell crank lever 8 which is actuated thereupon in a counterclockwise direction by its spring 9 to shift bell crank 30, to in turn shift a code bar 20. Each of the code bars 20 is controlled by a selector magnet 4. The bars 13 are selectively operated upon a permuted setting of bars 20, in well known manner. In Fig. 2 one of the selector bars, namely the second selectable stop bar 13 from the top is shown in its leftward or operated position. Each one of the selectable stop bars 13 is indicative of a horizontal row of type elements 10 in the member 11, so that as is well known in the art, the member 11 is raised or lowered to bring a row of elements 10 into cooperation with the printing hammer and platen.

Pivotally supported at 16 on the member 11 is a toggle element 17 which is provided with an anticipator or buffer portion 18 adapted to cooperate with a selected one of the selectable stop bars 13; that is, one of the bars 13 which is shown in the operated or projected position shown in Fig. 2 at 19. Toggle element 17 is normally urged in a counterclockwise direction by a spring 21 distended between the vertical arm of the element 17 and a point 22 on the member 11. Moreover, toggle element 17 is provided with a projection 23 which cooperates with a lateral projection 24 of member 11 to limit the counterclockwise movement or rotation of the toggle element 17 by the spring 21. Thus, the toggle element 17 is shown in Fig. 1 in its quiescent condition with its projection 23 resting against stop 24.

Pivotally articulated to toggle element 17 at its extremity 25 is one end of a second toggle element 26. The other end of toggle element 26 is pivotally articulated at 27 to one end of a con-

necting link 28. The stud 27 is provided with a shoulder portion or disc 29 which is adapted to slide in the slot 31 in member 11. Pivotally connected to the lower end of link 28 at pivot point 32 is a lever 33 which is pivoted at 34 to a suitable bracket (not shown) in the apparatus in which the present mechanical movement may be embodied. Lever 33 is provided at a suitable position between pivots 32 and 34 with a pivot stud 35 to which one end of a link 36 is pivotally connected. The lower end of link 36 is pivotally connected at 37 in an eccentric manner to an eccentric or crank shaft 38. The member 11 is also provided with a fixed stop portion or projection 39 which ultimately cooperates with the selectable stop bars 13 in each vertical reciprocation of the member 11 depending upon which one of the selectable stop bars 13 has been projected in the path thereof. The eccentric shaft 38 in its rotation imparts a fixed movement to the link 36, lever 33, and link 28. Since the degree or extent of movement of the member 11 is variable, due to the actuation of one of the bars 13, this movement is compensated for by the toggle or knee-action arrangement comprising elements 17 and 26.

In the operation of the mechanism according to the present invention, as exemplified by Figs. 1 to 5 of the drawings, selectable stop bars 13 are selectively projected into the path of the stop projection 39 and the anticipator 18 by any well known means, such as manually, or automatically under local control, or automatically under remote control, the latter may or may not be achieved in response to telegraph signals. It is understood that the present invention is not limited to the specific application shown, but is intended to supply a mechanical movement in which two members normally are directly and rigidly coupled, and in which a driven member may be stopped or blocked at intermediate points in its travel in a smooth or cushioned manner, independently of the motion of the driving member.

Thus, in the embodiment shown a selectable stop bar 13 is selected in response to received code combinations of signal impulses, or by any other appropriate means, following which the cam or drive shaft 38 is initiated into rotation. The fixed stop portion or projection 39 will ultimately cooperate with the selected stop bar 13, for example, the bar 19. In the upward movement, the buffer portion or anticipator 18 is the first to strike a stop bar 13 which has been projected into its path of movement, and in response to further movement imparted to member 11 by the eccentric 38 through the lever 33, the toggle element 17, due to the knee or toggle action between elements 17 and 26, tends to rotate clockwise thereby stretching the spring 21, until the striking edges of anticipator 18 and the stop projection 39 coincide, and stop 39 thus is brought to bear against the stop bar 13. Hence, further movement of stop 39 is blocked by the selected stop bar 13. Thus said toggle or knee-action elements through changing leverage ratios comprise a ratio changing device to provide a yielding or cushioning means for movable member 11.

Moreover, it is noted that the movement imparted to links 28 and 36 and the lever 33 by the eccentric or crank shaft 38 is fixed and invariable, while the movement to member 11 is variable and is governed by the stop bars 13. The utility of the toggle or knee-action drive according to the present invention resides in the provision of a compensating means for these two different types of movement. Furthermore, the shock due to the moving object or member 11 striking against the fixed stop 13 is dissipated, and as the member 11 approaches the stop 13 at high speed, the impingement of stop projection 39 upon the stop bar 13 is anticipated by the anticipator or buffer portion 18, so that a gradual slowing down of the movement of member 11 occurs, whereby the member 11 is caused to come to rest lightly against the selected stop bar 13. Moreover, as the stop projection recedes from the stop bar 13, the movement thereof is likewise governed by the toggle means, whereby the acceleration of motion of member 11 corresponds inversely to the deceleration, so that the member 11 starts from rest and gradually accelerates until the motion of link is attained.

In Fig. 6, the toggle elements 17 and 26 are illustrated diagrammatically. In the solid line position the vertical arm of element 17 and the element 26 are shown in vertical alignment, being biased thereto by the spring 21. In the practice of the invention said elements 17 and 26 are positioned substantially in vertical alignment, as shown in Fig. 1. The anticipator 18, of course, initiates the collapsing action of the toggle or knee-action means upon impingement against a selected stop bar 13. Initially, the points 27 and 16 move correspondingly in their vertical path, until the anticipator 18 encounters a stop bar 13, whereupon point 25 is caused to move along a locus whose radius centers substantially from the point of contact of anticipator 18 with the selected stop bar 13. Thereafter, the point 16 in its motion decelerates smoothly, so that the abutment 39 (Fig. 1) reaches the stop bar 13 without shock.

The motion of the member 11 is illustrated graphically in Fig. 5. The deceleration of motion of member 11 when approaching the first stop bar 13 is represented by the portion of curve between the numerics 41 and 42. That is, the point 41 represents the instant when the buffer portion or anticipator 18 strikes the first stop bar 13, and the curve between points 41 and 42 represents the deceleration of motion of the member 11, at the conclusion of which the stop portion 39 thereof touches the first stop bar. The flat portion 52 of the curve represents the period of rest of stop portion 39 against bar 13, and the portion of curve between points 53 and 54 represents the acceleration of the stop portion 39 as it leaves the stop bar 13 to return to the position shown in Fig. 1.

Likewise, the curve between points 43 and 44 represents the deceleration of reciprocating member 11 as it approaches the second stop bar 13. Also, curves 45—46 and 47—48 represent decelerations of member 11 as it approaches the third and fourth stop bars, respectively. The total travel of the link 28 indicated in dotted line by the label 49 in Fig. 3 is indicated by the numeric 51 in Fig. 5.

Although a particular embodiment of the present invention has been shown, it is understood, of course, that the invention is not to be limited thereto since many modifications may be made, and it is therefore contemplated by the appended claims to cover any such modifications as fall within the spirit and scope of the invention.

What is claimed is:

1. In combination, a movable member, selectively operated stop bars for determining the extent of movement of said member, drive means, a knee-action means operatively connected between said member and said drive means, said

knee-action means comprising an anticipator cooperable with said stop bars, and abutting means on said member cooperable with said stop bars, whereby the movement of said member by said drive means is decelerated between the time of contact of said anticipator and said abutting means with said stop bars.

2. In combination, a movable member, a plurality of stop bars, signal responsive means for selectively operating said stop bars to determine the extent of movement of said member, drive means having a fixed extent of movement, knee-action linkage operatively connected between said member and said drive means for imparting a variable extent of movement to said member as determined by said stop bars, said linkage comprising an anticipator cooperable with said stop bars, and abutting means on said member cooperable with said stop bars, whereby the movement of said member by said drive means is decelerated between the time of contact of said anticipator and said abutting means with said stop bars.

3. In combination, a reciprocating member, a series of bars, means for selectively operating said bars, power means, knee-action means associated with said member, said knee-action means comprising an anticipator cooperable with said bars, and abutting means on said member cooperable with said bars, whereby the movement of said member by said power means is decelerated by said knee-action means prior to the contact of said abutting means with a selected bar.

4. In combination, driving means, driven means, said driven means having abutting means, a knee-action linkage connecting said driving means to said driven means, power means for normally maintaining a substantially constant speed ratio between said driving means and said driven means, a series of selectable stop elements, said abutting means adapted to impinge against said stop elements and anticipator means carried by said knee-action linkage, said anticipator means adapted to impinge against said selectable stop elements to control the collapsing action of said knee-action means, whereby said knee-action linkage is rendered effective for changing said ratio to reduce the speed of said driven means with respect to the speed of said driving means between the respective times of contact of said anticipator means and said abutting means with a selected one of said stop elements.

5. In combination, a driving member, a driven member, a stop means for determining the extent of travel of said driven member, abutting means on said driven member adapted to impinge against said stop means, a knee-action means for connecting said driving member and said driven member, means for normally conditioning said knee-action means on substantially dead center, and an anticipator carried by said knee-action means, said anticipator adapted to impinge against said stop means for moving said knee-action means from said dead center condition to initiate the deceleration of said driven member between the respective times of contact of said anticipator and said abutting means with said stop means.

6. In combination, a movable member, selectively operated stop bars for determining the extent of movement of said member, drive means, knee-action means operatively connected between said member and said drive means, said knee-action means including an anticipator means adapted to impinge against said bars to control the collapsing action of said knee-action means, and abutting means on said movable member also adapted to impinge against said stop bars, whereby the movement of said member by said drive means is decelerated by said knee-action means prior to the contact of said abutting means with a selected stop bar.

7. In combination, a member to be moved, stop means for determining the extent of movement of said member, power means, knee-action means operatively connected between said member and said power means, said knee-action means comprising an anticipator portion adapted to impinge against said stop means to control the collapsing action of said knee-action means, and abutting means on said member also adapted to impinge against said stop means, whereby the movement of said member is decelerated by said knee-action means prior to the contact of said abutting means with said stop means.

WALTER J. ZENNER.

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