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POWER DRIVEN MECHANISM FOR OPERATING ESCAPEMENT AND OTHER INSTRUMENTALITIES OF TYPEWRITERS OR LIKE MACHINES

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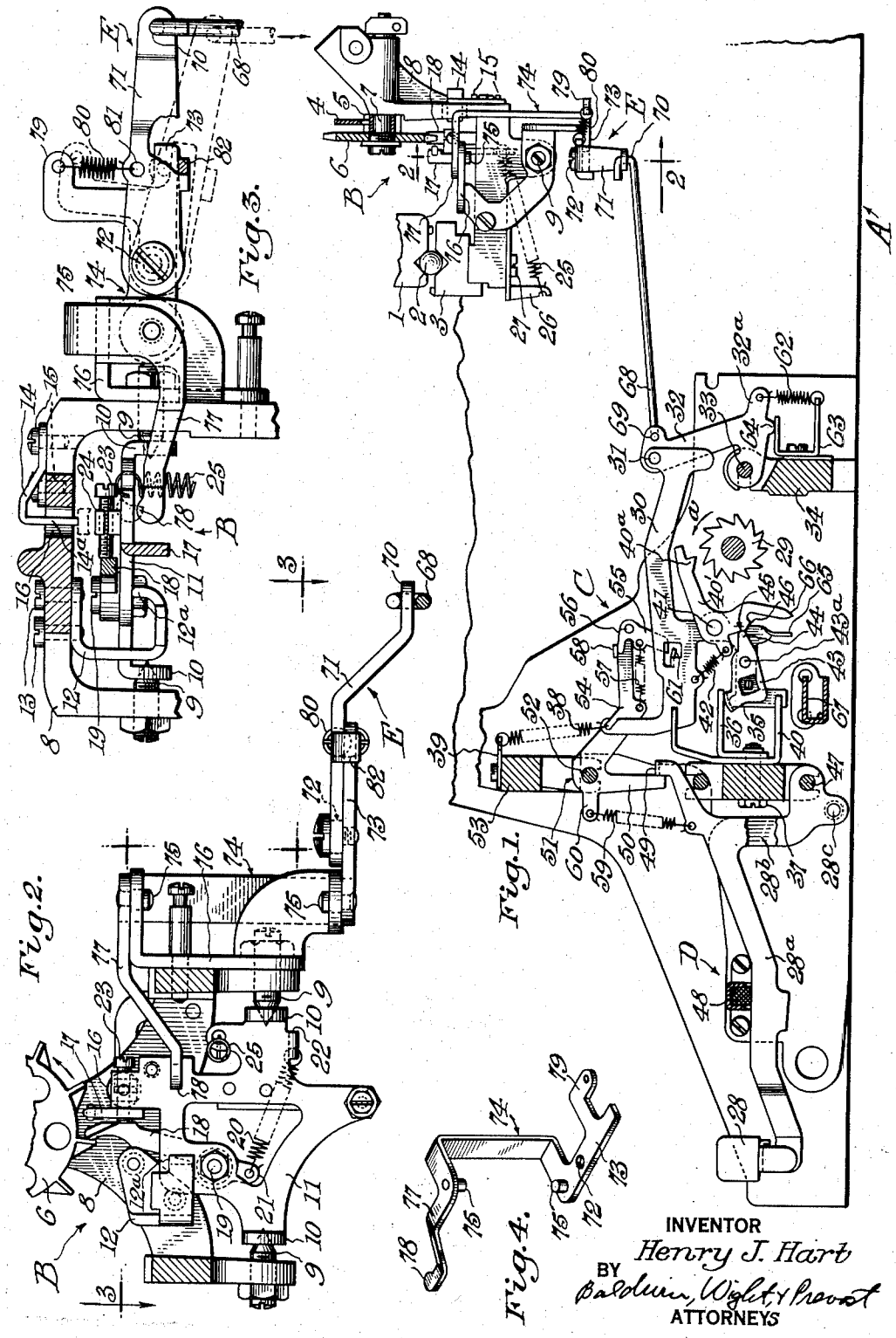

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

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POWER-DRIVEN MECHANISM FOR OPERATING ESCAPEMENT AND OTHER INSTRUMENTALITIES OF TYPEWRITERS OR LIKE MACHINES

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9 Claims. (Cl. 197—17)

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This invention relates to power driven mechanism for operating escapement and other instrumentalities of typewriter or like machines.

In one of its aspects the invention relates more particularly to improvements in power generating or transmitting mechanism of the kind disclosed in the co-pending application of William H. Kupper, Serial No. 6,066, filed February 3, 1948. The mechanism disclosed in this co-pending application includes a driving member in the form of a continuously rotating snatch roll adapted to transmit drive to a typewriter instrumentality through a toothed driven element adapted to be moved, under key control, into a snatch roll tooth interspace.

An object of the present invention is to provide a new and improved arrangement for varying or adjusting the amount of driving effort imposed upon or transmitted through a toothed driven element by a continuously rotating toothed snatch roll in a mechanism, e. g., of the kind disclosed in the co-pending application referred to.

Another object of the invention is to provide adjusting or drive-effort-varying means of the kind referred to by which the adjustment is effected by variably limiting the extent to which the toothed driven element is moved into a tooth interspace on the snatch roll.

In another of its aspects, the invention relates more particularly to mechanism or connections for transmitting operating effort to the escapement mechanism of a typewriter or like machine.

Another object of the invention is to provide a new and improved train of driving connections between a power generating mechanism and the escapement mechanism of a typewriter or like mechine, the connections including cushioning means of novel construction adapted to minimize abruptness of operation of the escapement mechanism, avoid jamming of the parts, and minimize noise and vibration.

A further object of the invention is to provide an escapement mechanism and associated train of power transmitting connections which are so coordinated as to enable the escapement mechanism to be adjusted closely for efficient operation without its being necessary to make compensating adjustments in the power driving mechanism or in the intervening train of driving connections.

Other objects of the invention will become apparent from a reading of the following description of a preferred embodiment of the invention, the appended claims, and the accompanying drawing, in which:

Figure 1 is a view, partly in elevation and partly in vertical section, fore and aft of a typewriter embodying the invention, showing only some of the conventional or standard typewriter parts in order to illustrate the application of mechanism embodying the invention to a typewriter construction;

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Figure 2 is a vertical, sectional view on the line 2—2 of Figure 1, drawn on an enlarged scale and showing escapement mechanism and actuating mechanism therefor constructed in accordance with the invention;

Figure 3 is a horizontal section on the irregular line 3—3 of Figure 2; and

Figure 4 is a detail, perspective view of an escapement operating lever.

The invention may be embodied in typewriters or like machines of various kinds. For the purposes of illustration, the invention is shown as being embodied in an office type typewriter having, except for the power mechanism to be described, many features in common with the well known Royal standard typewriter. The drawings show only enough of the standard or known typewriter construction to assist in illustrating the manner in which mechanism embodying the invention may be coordinated with other parts of a typewriter construction.

The known construction illustrated includes a main frame A on which a carriage is mounted for letter spacing and return movements by means of a top rail 1 secured to the carriage, and rolling upon balls 2, which in turn are adapted to roll on a frame-mounted bottom rail or truck 3.

The carriage may be driven toward the left, that is, in the letter-spacing direction, by any suitable mechanism, for example, by a spring barrel and draw band of known or suitable construction (not shown).

For controlling the feeding of the carriage in letter-spacing direction to take place by letter space increments, the carriage is equipped with a rack 4 (Figure 1), cooperable with an escapement mechanism generally designated B. With exceptions to be pointed out hereinafter, the escapement mechanism and the escapement operating mechanism are similar to mechanisms customarily embodied in Royal standard or manually operated typewriters, and include an escapement pinion 5 coupled by a ratchet pawl (not shown) with an escapement wheel 6 journaled on a pin 7 carried by a frame-mounted bracket 8. The bracket 8 is equipped with cone-shaped bearing screws 9—9 extending into conformingly shaped bearing recesses in mounting ears 10—10 integral with an oscillatable escape-

ment rocker plate 11. Rocking of the plate part 11 in one direction on the screws 9—9 is limited by a stop finger 12 secured to the bracket 8 by screws 13. The finger 12 extends from behind the plate 11 forwardly past the plate, is then turned so as to extend parallel to and in front of the plate, and has its extreme end part 12a projected rearwardly so as to be engageable by a part of the plate above the pivots 9—9 when the plate is rocked counterclockwise as viewed in Figure 1. Rocking of the plate in the opposite direction is limited by a stop finger 14 secured to the bracket 8 by screws 15, and having a part 14a projecting forwardly through an opening 16 in the bracket 8 so as to be engageable with the rear face of the rocker plate 11 when the latter is rocked clockwise as viewed in Figure 1. Either or both of the fingers 12 and 14 can be bent, mauled, or otherwise deformed so as to adjust the limits of rocking of the plate 11.

The plate 11 is equipped with the usual fixed dog 17 and limber dog 18 pivoted on the plate as at 19, and urged counterclockwise as viewed in Figure 2 by a spring 20 interposed between a heel 21 on the limber dog and an ear 22 on the rocker plate 11. An abutment screw 23 has threaded connection with a boss or lug 24 on the back of the plate 11, and can be adjusted for determining the limit of rocking of the limber dog 18 when the latter is engaged by a tooth of the escapement wheel 6. A normalizing or return spring 25 is interposed between a part of the rocker plate 11 above the pivots 9 and a sub-bracket 26 mounted underneath the frame-mounted bracket 8 by a screw 27, the spring 25 normally holding the rocker plate 11 in its Figure 1 position with the limber dog 18 holding the escapement wheel 6 against rotation and hence, holding the carriage stationary. When the rocker plate 11 is oscillated back and forth, the dogs 17 and 18 will cooperate with the escapement wheel in a well known manner for effecting the desired letter-spacing incremental movements of the carriage.

In general, the parts described so far do not, in themselves, constitute the present invention. The invention resides in other parts to be described, and combinations of such other parts with each other and with parts already described.

Broadly considered, oscillation of the plate 11 and letter-space feeding of the carriage are effected by power driven means generally designated C which are made effective by operator-controlled means D including a manually operable space bar element 28. Power is transmitted from the power-driven means C through a train of driving connections E extending from the means C to the escapement mechanism B. The construction and arrangement of the parts is such that, upon depression of the space bar 28, a quickly generated power impulse is transmitted through a cushion device to the plate 11 to rock the latter clockwise as viewed in Figure 1, the power impulse being of short duration and being followed by returning of the plate 11 to its normal position by means including the normalizing spring 25.

The power driven mechanism C is generally similar to but embodies improvements in mechanism disclosed in the copending application of William H. Kupper, Serial No. 6,066, filed February 3, 1948. It includes a driving element, which operates continuously, and controllable driving connections, which normally are inoperative or ineffective, but which may be conditioned by the operator to effect operative driving connection between the continuously moving driving member and the train of connections E. The driver is constituted by a continuously rotating element, more particularly a toothed snatch roll or bar 29, which may be of known form, and which is adapted to be driven in the direction of the arrow *a* in Figure 1 by any suitable means, but preferably by an electric motor (not shown).

The means for transmitting drive from the driver 29 to the connections E includes an actuator 30 which extends fore and aft of the typewriter and above the member 29. The actuator 30 is pivoted as at 31 to a lever 32 at a point offset relatively to the pivotal mounting 33 of the lever on a fixed frame cross bar 34. The actuator has a forwardly extending part 35 projecting under an abutment or guide plate 36 mounted by screws 37 on the frame A, to extend parallel to the snatch roll 29. A spring 38, interposed between the front end of the actuator 30 and an anchor plate 39, yieldably urges the actuator to rock clockwise, and thus normally maintains the actuator in the position shown in Figure 1 with its front end part 35 bearing against the abutment or guide plate 36. Another abutment 40 is disposed below the abutment 36, and is slotted to receive and guide the lower extremity of the actuator part 35 for sliding movements.

In order to apply a power impulse to the train of driving connections E, the actuator 30 is operatively but indirectly connected to the driving member 29, the actuator itself never engaging the driving member. Mechanism for bringing about the operative connection of the actuator element 30 to the member 29 includes an interponent pawl 40', pivoted as at 41 on the actuator. A spring 42, anchored to the actuator 30 and connected to the pawl 40', biases or urges the latter to rock clockwise so as to move its nose 40a into engagement with the snatch roll 29. Normally, the pawl is maintained out of engagement with the snatch roll by the restraining action of a control element or trigger 43 which is pivoted as at 43a on the actuator 30. In the normal position of the trigger, its rear end 44 engages a holding surface 45 on the pawl so as to prevent the spring 42 from rocking the pawl element 40' into drive-transmitting engagement with the driving member 29. The pawl 40' is formed with an inclined resetter cam face 46 which is located just below the holding surface 45, and which is acted upon by the trigger for rocking the pawl counterclockwise, and thus resetting it in normal, inoperative position.

Operator controlled means is provided for bringing about operative driving connection between the driver 29 and the actuator 30. This means includes the manually operable space bar element 28 pivoted as at 47 on the frame A. The space bar 28 is carried by a composite lever construction including right and left hand arms 28a and 28b respectively, joined by a cross rod 28c. Normally, the space bar assembly is held in its upper position with the arms 28a and 28b engaging a cushion stop 48.

The space bar arm 28a has an upward projection 49 disposed behind an arm 50 of an operating lever 51, pivoted as at 52 on a frame-mounted cross bar 53. The lever 51 has another arm 54 on which a limber dog or flipper 55 is pivoted at 56. A spring 57 urges the limber dog 55 to rock clockwise to yieldably retain it in its normal position of rest against a limit stop 58. The dog 55 can swing counterclockwise from the position shown in Figure 1, but cannot move clockwise from this position. A returning spring 59, inter-

posed between the space bar arm 28a and a short arm 60 on the lever 51, yieldably holds the lever 51 and the space bar arm 28a in their normal positions. In the normal positions of the parts, the lower end of the limber dog 55 overlies a contact ear 61 on the actuator 30.

In operation, when the space bar 28 is depressed, the lever 51 is rocked clockwise to cause the flipper 55 to push the actuator 30 downwardly to an initial extent sufficient to bring the trigger 43 into engagement with the abutment 40. This causes the trigger to be rocked clockwise about its pivot 43a, so as to release the pawl 40', which is then moved by the spring 42 into engagement with the snatch roll 29. The snatch roll then drives the pawl 40' and actuator 30 as a unit so as to rock the lever 32 and operate the escapement mechanism through the train of connections E. When the pawl 40' is cast off from engagement with the snatch roll 29, the spring 38 lifts the actuator 30 to bring the trigger 43 into engagement with the upper, trigger-resetting abutment 36. This causes the trigger 43 to be rocked counterclockwise, so as to move its end 44 against the resetting cam face 46 of the pawl 40', thereby restoring the latter to its inactive position. The parts of the mechanism C will then be returned to their normal positions by a spring 62 interposed between a rearwardly extending arm 32a on the lever 32 and the lower part of a bracket 63 fixed to the frame cross bar 34. The escapement normalizing spring 25 cooperates with the spring 62 for returning the parts to their normal positions. The lever 32 is provided with a downwardly extending projection 64 engageable with the upper part of the bracket 63 for limiting the return movement of the lever 32 and the connected parts to their normal positions under the urge of the springs 62 and 25.

Means are provided for adjusting or varying the amount of driving impulse generated by the power mechanism C. In accordance with the invention, this variation or adjustment is effected by variably limiting the extent to which the actuator pawl nose 40a enters a tooth interspace on the snatch roll 29 under the urge of the spring 42 when the restraint of the trigger 43 on the pawl 40' is discontinued. In the form shown, the actuator 30 is provided with a downwardly extending stop element or finger 65 which is disposed in front of and normally out of contact with a downwardly extending stop part, heel, or finger 66 on the pawl 40'. When the pawl 40' is rocked clockwise by the spring 42 so as to move the pawl nose 40a into a snatch roll tooth interspace, the pawl stop 66 moves toward the actuator stop 65, which may be so positioned as to be engaged by the stop 66 to arrest rocking of the pawl 40' before the tooth 40a moves to the root of the snatch roll tooth interspace. By variably positioning one of the stops 65, 66, e. g., by bending the stop 65 towards or away from the stop 66, the extent to which the pawl tooth 40a enters the tooth interspace can be varied. Consequently, the angle through which the snatch roll rotates while in contact with the pawl, which determines the amount of driving of the pawl 40' and actuator 30 by the snatch roll 29, can be varied. Any suitable means or construcion may be provided for adjusting one of the stops 65, 66 relatively to the other, but in the preferred construction the stop 65 is formed integrally with the actuator 30 so as to be bendable toward or away from the stop 66.

It is apparent that power mechanisms including such parts as the snatch roll 29, actuator 30 and pawl 40' for operating instrumentalities other than escapement mechanism, e. g., type actions, carriage return mechanisms and so on, may be provided with means corresponding to the relatively adjustable stops 65 and 66 for varying the extent to which a pawl nose enters a snatch roll tooth interspace, so as to vary the power delivered to the operated instrumentality.

In typewriters or like machines in which all or some of the instrumentalities to be operated, e. g., type bars, carriage return mechanism, tabulating mechanism, as well as escapement mechanism, are operated by power, it may be desirable to provide means for varying collectively the extent of driving of the several actuator pawls corresponding to the pawl 40' and associated with the other mechanisms referred to. This may be accomplished by providing a knock off bar 67 mounted on the main frame so as to extend under the front ends of all of the actuators corresponding to the actuator 30 shown in Figure 1. Any suitable means (not shown) may be provided for adjustably tilting or otherwise variably positioning the knock off bar 67 so that it will be engaged by the lower ends of the actuators to control the timing of disengagement of the associated actuator pawls from the snatch roll.

The train of connections E is so arranged, constructed, and coordinated with the power mechanism C and escapement mechanism B as to suppress or cushion the impact or concussion which otherwise would be transmitted abruptly from the power mechanism C to the escapement mechanism B. Accordingly, undesirable noise and harmful shocks are prevented, and danger of jamming of the machine with resultant damage is eliminated. In the construction shown, a pull link 68 is pivoted as at 69 to the lever 32, and is pivoted as at 70 to a lever 71. The lever 71 is pivoted at 72 on the lower arm 73 of a lever 74 provided with pins or trunnions 75—75 by which it is pivoted on a bracket 76 mounted on the main escapement mechanism bracket 8. The upper end of the lever 74 has an arm 77 formed with a rounded end 78 disposed immediately in front of the escapement rocker plate 11 above the pivots 9—9.

The arm 73 of the lever 74 has a rearwardly offset ear 79 to which is anchored the rear end of a force-transmitting cushion spring 80, the front end of which is connected in a hole 81 in the lever 71. The spring 80 urges the lever 71 relatively counterclockwise with respect to the lever 74 as viewed in Figure 3, such movement of the lever 71 being limited by engagement of an ear 82 formed integrally on the lever 71 with the lower arm 73 of the lever 74. In the normal position of the parts, shown in Figure 3, the stop ear 82 is in contact with the lever arm 73, and the spring 80 is preloaded or under initial tension.

In operation, when the space bar 28 is depressed, the pawl 40' is moved into engagement with the snatch roll 29, the actuator 30 is moved forwardly, and the lever 32 is rocked counterclockwise as viewed in Figure 1, in the manner previously explained. A momentary, quickly accelerating impulse is transmitted through the pull link 68 to the lever 71 to rock the latter clockwise as viewed in Figure 3. Such rocking of the lever 71 does not transmit a positive actuating effort to the lever 74 and escapement rocker plate 11, but acts through the cushion spring 80 to rock the lever 74 impositively or yield-

ingly, but with sufficient force to enable the lever 74 to rock the escapement plate 11 until it engages the stop finger 14a. The driving impulse is of short or momentary duration, and, as soon as the pawl 40' becomes disengaged from the snatch roll, the springs 25 and 62 return the actuator 30, lever 32, link 68, levers 71 and 74, and escapement plate 11 to their normal positions limited or determined by the stop finger 12a. The stop 12a and/or the stop 14a may be adjusted to provide a very fine adjustment of the limits of oscillation of the plate 11 for effecting most efficient operation of the escapement mechanism. Inasmuch as the escapement rocker plate 11 is operated in both directions by springs, in one direction by the spring 80 and in the other direction by the spring 25, it is not necessary to make compensating adjustments of the parts of the mechanism C when the stops 12a and 14a are adjusted. The spring 80 has sufficient capacity to yield to enable the operating force provided by the mechanism C to operate the escapement plate 11 effectively without its being necessary to coordinate exactly the adjustment of the stop finger 14a and the stops 65 and 66 on the actuator 30 and pawl 40'.

The mechanism disclosed embodies the invention in a preferred form, but it is intended that the disclosure be illustrative rather than definitive, the invention being defined in the claims.

I claim:

1. In power operating mechanism for a typewriter or like machine, a carriage escapement mechanism; a driving member; an actuator; means including a cushioned motion-transmitting connection interposed between said actuator and said escapement mechanism; an interponent mounted on said actuator for movements into and out of operative engagement with said driving member and being biased to move into engagement therewith; a trigger normally maintaining said interponent disengaged from said driving member; a manually operable escapement control element; means responsive to depression of said element for actuating said trigger to release said interponent and enable it to move into engagement with said driving member, whereby said actuator will be driven by said driving member so as to operate said escapement mechanism; and trigger re-setting means effective upon return movement of said element when said driving member is stationary for moving said trigger reversely to its releasing movement and thereby disengaging said interponent from said driving member.

2. In a power operating mechanism for a typewriter or like machine; a carriage escapement mechanism; a rotatable driving member; a movably mounted actuator; means including a cushioned motion-transmitting connection interposed between said actuator and said escapement mechanism; an interponent mounted movably on said actuator; a spring urging said interponent to move into drive-transmitting engagement with said driving member; a trigger mounted movably on said actuator and normally occupying a position in which it maintains said interponent out of drive-transmitting engagement with said driving member; an abutment; and manually controlled means for imparting to said actuator sufficient initial movement to move said trigger into engagement with said abutment to thereby move said trigger on said actuator and release said interponent to enable the latter to be moved by said spring into drive-transmitting engagement with said driving member, whereby said actuator will be driven by said driving member so as to operate said escapement mechanism.

3. In a power operated typewriter or like machine, a carriage escapement mechanism including an oscillatable part; a driving member; a train of connections between said driving member and said oscillatable part including an actuator drivable by said driving member, a first pivoted lever adapted to operate said oscillatable part, a second lever, means pivotally mounting said second lever on said first lever, a spring interposed between said levers and urging said second lever to rock in one direction about its pivot on said first lever, a stop on one of said levers engageable with the other of said levers for limiting rocking of said second lever in said direction, and means connecting said second lever to said actuator and being operable by said actuator to rock said second lever in the opposite direction whereby to rock said first lever through said spring; and manually operable means for controlling transmission of drive from said driving member to said actuator.

4. In a power operated typewriter or like machine, a carriage escapement mechanism including an oscillatable part; a continuously driven rotary toothed snatch roll; a train of connections between said snatch roll and said oscillatable part including an actuator normally disconnected from said snatch roll but being controllably connectible therewith substantially instantaneously, whereupon the actuator is abruptly accelerated from rest position, a first pivoted lever adapted to operate said oscillatable part, a second lever, means pivotally mounting said second lever on said first lever, a spring interposed between said levers and urging said second lever to rock in one direction about its pivot on said first lever, a stop on one of said levers engageable with the other of said levers for limiting rocking of said second lever in said direction, and means connecting said second lever to said actuator and being operable by said actuator to rock said second lever in the opposite direction whereby to rock said first lever through said spring; and manually operable means for controlling connecting of said actuator to said snatch roll.

5. In a power operating mechanism for a typewriter or like machine, a rotatable toothed snatch roll; an instrumentality to be operated by said snatch roll; means for transmitting drive from said snatch roll to said instrumentality including an interponent having a contact part normally disengaged from said snatch roll but being engageable therewith by entrance into a tooth interspace thereof; operator controlled means for effecting such engagement of said interponent part with said snatch roll; an adjustable stop separate from said operator controlled means and said snatch roll; and another part on said interponent engageable with said stop for variably limiting the extent of entrance of said interponent contact part into a snatch roll tooth interspace, adjustment of said stop thereby variably determining the extent of driving of said interponent and said instrumentality by said snatch roll.

6. In a power operating mechanism for a typewriter or like machine, a rotatable toothed snatch roll; an escapement operating mechanism to be operated by said snatch roll; means for transmitting drive from said snatch roll to said escape-

ment operating mechanism including an interponent having a contact part normally disengaged from said snatch roll but being engageable therewith by entrance into a tooth interspace thereof; operator controlled means for effecting such engagement of said interponent part with said snatch roll; an adjustable stop separate from said operator controlled means and said snatch roll; and another part on said interponent engageable with said stop for variably limiting the extent of entrance of said interponent contact part into a snatch roll tooth interspace, adjustment of said stop thereby variably determining the extent of driving of said interponent and said escapement operating mechanism by said snatch roll.

7. In a power operating mechanism for a typewriter or like machine, a rotatable toothed snatch roll; an instrumentality to be operated by said snatch roll; an actuator connected to said instrumentality and being normally disconnected from said snatch roll; a spring urged interponent movably mounted on said actuator and having a contact part normally disengaged from said snatch roll but being engageable therewith under spring urge by entrance into a tooth interspace thereof; operator controlled means normally restraining said interponent from engagement with said snatch roll but being operable for discontinuing its restraint to enable the spring urge to effect engagement of said interponent contact part with said snatch roll; an adjustable stop on said actuator; and another part on said interponent engageable with said stop for variably limiting spring-urged movement of said interponent relatively to said actuator, adjustment of said stop variably determining the extent to which said interponent contact part can be moved by spring urge into a snatch roll tooth interspace, and consequently variably determining the extent of driving of said interponent, said actuator, and said instrumentality by said snatch roll.

8. In a power operating mechanism for a typewriter or like machine, a rotatable toothed snatch roll; an escapement operating mechanism to be operated by said snatch roll; an actuator connected to said escapement operating mechanism and being normally disconnected from said snatch roll; a spring urged interponent movably mounted on said actuator and having a contact part normally disengaged from said snatch roll but being engageable therewith under spring urge by entrance into a tooth interspace thereof; operator controlled means normally restraining said interponent from engagement with said snatch roll but being operable for discontinuing its restraint to enable the spring urge to effect engagement of said interponent contact part with said snatch roll; an adjustable stop on said actuator; and another part on said interponent engageable with said stop for variably limiting spring-urged movement of said interponent relatively to said actuator, adjustment of said stop variably determining the extent to which said interponent contact part can be moved by spring urge into a snatch roll tooth interspace, and consequently variably determining the extent of driving of said interponent, said actuator, and said escapement operating mechanism by said snatch roll.

9. In a power operating mechanism for a typewriter or like machine, a rotatable toothed snatch roll; an instrumentality to be operated by said snatch roll; an actuator connected to said instrumentality and being normally disconnected from said snatch roll; a spring urged interponent movably mounted on said actuator and having a contact part normally disengaged from said snatch roll but being engageable therewith under spring urge by entrance into a tooth interspace thereof; operator controlled means normally restraining said interponent from engagement with said snatch roll, but being operable for discontinuing its restraint to enable the spring urge to effect engagement of said interponent contact part with said snatch roll; a first stop element on said actuator; and a second stop element on said interponent engageable with said first stop element for limiting spring-urged movement of said interponent relatively to said actuator and thus limiting the extent of entrance of said interponent contact part into a snatch roll tooth interspace and determining the extent of driving of said interponent, said actuator, and said instrumentality by said snatch roll, one of said stop elements being bendable towards and away from the other of said stop elements for varying the limit of entrance of said interponent contact part into a snatch roll tooth interspace.

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