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TYPEWRITING MACHINE

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Fig. 1

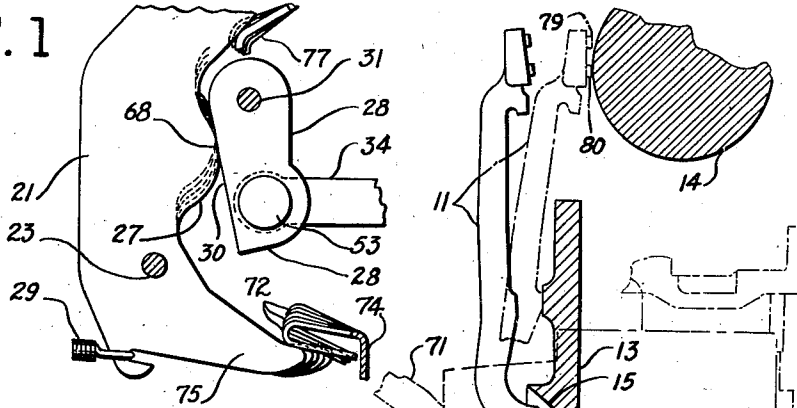


Fig. 2

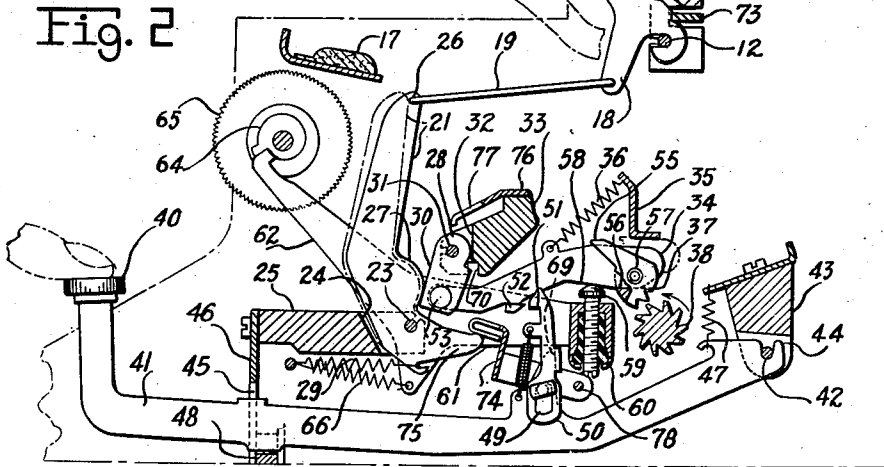
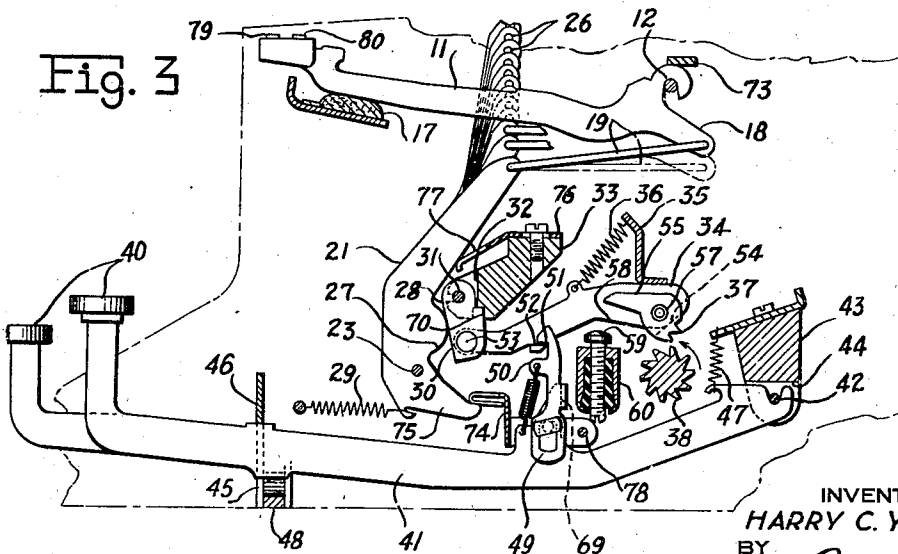


Fig. 3



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TYPEWRITING MACHINE

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11 Claims. (Cl. 197-17)

This invention relates to typewriting machines and more particularly to power-driven type-actions therefor. The invention has for one of its objects to provide improvements in power-drive connections from a common straight power-operator to a set of arcuately arranged type-bars whereby uniform and sharply outlined type-impressions are obtainable from all type-bars regardless of the differing drive-connections required from the common power-operator to the individual type-bars. The invention more specifically relates to power-driven typewriters wherein separate type-bar driving-members are individually connectable to a common power-operator.

It is a further object of the invention to provide improved power-drive connections to the individual type-bars from the common power-operator so that corresponding movements given to each driving-member by the common operator will result in substantially equidistant type-bar movements toward the platen.

It is a further object of the invention to improve the drive-connections to the various type-bars in cooperative association with a common power-stroke regulator to collectively predetermine the extent of power-drive actuation of all type-bars toward the platen uniformly.

It is another object of the invention to provide means whereby the type-bars strike against, rebound, and recede from the platen independent of the return to normal positions of the associated driving-members.

A further object of the invention lies in the simplicity of the mechanism and the small number of different parts for accomplishing the above and other results.

The type-bars according to this invention are all power-driven toward the platen a substantially equal distance, hence, the type-bars continue by momentum toward the platen. Connections between the type-bars and the associated driving-members provide for substantially uniform distance power-movements of all types toward the platen in substantially equal drive periods. All type-actions, therefore, attain upon power operation practically the same momentum at correspondingly operated drive-member positions. The type-bar driving members are selectively connectable to the common power-operator by keys or other controls, but the period of power-connection of the individual driving-members is collectively and equally predetermined by a common regulator. The setting of the regulator therefore predetermines the

amount of printing-momentum that each type-bar will receive during a power-operation, so that in each adjusted regulator-position all typing impressions will be of substantially uniform strength.

In the accompanying drawing:

Figure 1 is a side elevation showing differently formed rolling-surfaces on several type-action-levers.

Figure 2 is a side elevation of a centrally disposed partly operated type-action, the power-drive connection from the common operator having been disrupted so that continued movement of the type-bar is solely by momentum.

Figure 3 is a side-view of the type-action and the associated power-drive parts shown in Figure 1 in normal position.

Referring now more particularly to the drawing, type-bars 11 are pivotally mounted in a semi-circular array upon a common arcuate pivot rod 12 provided upon a segment 13. Each type-bar 11 is guided in a separate segment slot 15 for pivotal movement about said rod 12 toward a common printing point on a platen 14. The type-bars 11 rest normally against an arcuate pad 17. Each type-bar includes an arm 18 extending normally downwardly and rearwardly from the type-bar pivot-rod 12. A link 19 is connected to each type-bar arm 18 and extends forwardly therefrom. Each link 19 is connected at its forward end to an upright sub-lever 21. The levers 21 are pivoted at their lower ends upon a common pivot-rod 23 and are separately guided in vertical horizontally-spaced guide-slots 24 provided in cross-bar 25. The links 19 are connected to the levers 21 at graded lever-lengths from the lever-pivots and the points of connections 26 lie substantially in an arc in front of an arc along which the links 19 are connected to the type-bars 11. Each lever 21 includes a curved rolling-surface 27. A downwardly pending pivoted sub-lever or arm 28 is directly in rear of each lever 21 and each arm has a rolling surface or edge 30 facing the rolling surface or edge 27 of the associated lever 21. The arms 28 are pivoted on a straight axis upon a common pivot rod 31 and are guided in slots 32 provided in a cross bar 33. A type-action driving-link in the form of a pusher-actuator 34 is pivotally connected at its front-end to each of the lower-ends of the arms 28. The rear of each driving-link 34 is urged upwardly and rearwardly by a spring 36 against an angle bar 35 so that a snatch pawl 37 upon each link 34 occupies the normal position seen at Figure 3, clear

and disconnected from a common transversely extending, straight power-operator 38. The power-operator 38 may be in the form of a transversely extending roll having snatch teeth and may be continuously revolving in the direction of an arrow indicated in each of Figures 2 and 3. The driving-links 34 and the arms 28 are arranged in straight rows parallel to the operator 38.

Each drive-link 34 is selectable for a single power operation by the common power-operator or snatch-roll 38 under the control of a type-action selecting type-key 40. Each type-key 40 is attached to a key-lever 41 that is pivoted rearward of the snatch-roll 38 upon a common pivot-rod 42. The pivot-rod 42 extends through a bar 43 which is slotted as at 44 to laterally guide the rear-ends of the key-levers 41. The front-ends of the key-levers are guided in slots 45 of a comb plate 46. Springs 47 urge the key levers 41 upwardly against the upper-ends of the slots 45 and a bar 48 limits the downward motion given to the key levers. Each key lever 41 carries an upwardly extending link 50 which is provided with a hook 51 that normally overlies a projection 52 on the associated driving-link 34. The hooked links 50 are spring-urged downwardly upon key-levers 41 so that link-slots 49 bottom upon key-lever-pins and so that the links 50 bear forwardly against stops 69 provided upon the key-levers. Any key-lever 41 when operated, lowers the associated drive-link 34 at its rear about the pivot connection 53 so that the snatch-pawl 37 will be drawn into operatively coupled engagement with the snatch-roll 38. The snatch pawls 37 are pivoted upon their associated driving links 34 and the center of gravity of each pawl lies forward of the pawl-pivot 57 so that with the parts at rest as seen in Figure 3 the snatch-pawl 37 contacts the driving link at 54. The snatch-roll 38 moves an engaged pawl 37 first about the pawl-pivot whereby the pawl-tail 55 engages the forward bottom edge of the angle-bar 35 to firmly wedge the pawl-teeth into full engagement with the snatch-roll teeth. The spring 36 is sufficiently strong to prevent all movement of the driving link 34 until the snatch pawl 37 is in firm engagement with the snatch-roll. The pivotal motion of the pawl 37 upon the link 34 is limited as seen at 56, Figure 2. The pawl 37, therefore, will, after an initial pivotal movement, pick up the link 34 for a forward type-action-driving movement. At the first portion of the forward movement of the driving-link 34, the projection 52 rides from under the hook 51 so that the key no longer controls the engagement between the power-roll 38 and the snatch-pawl 37. However, the snatch-pawl 37 remains in an engaging grip with the snatch-roll 38 until forcibly separated therefrom. This separation of each snatch-pawl 37 is effected by the coaction of a cam-face 58 provided upon the driving link 34 with a relatively stationary screw-abutment 59 after a certain size power-movement has been transmitted to the driving link 34. The screw abutments 59 are all mounted upon a single bar 60 which is carried at each side of the machine upon a pivoted arm 61 which arms form together with the bar, a single pivoted bar-structure. The bar-structure also includes a forwardly extending arm 62 which bears against the underside of a readily adjustable eccentric 64 having a dial control 65. The weight of the bar 60 and a spring 66 urge the whole bar-structure in clockwise direction about

the pivot-rod 23 (see Figure 2 of the drawing) so that the position of the eccentric 64 controls the position of the abutment bar 60. It will be seen that when the bar 60 is lowered or raised under the control of the dial 65 that the snatch-pawls 37 will become disconnected after varying drive-engagements with the snatch-roll.

The companion rolling surfaces 27 and 30 of each type-bar operating train are individually designed so that substantially equal power-driven movements will be transmitted to the type-bars 11 during correspondingly timed movements of the driving links 34. In effect the rolling connections are leverage and acceleration controlling connections. It follows, therefore, that in any adjusted position of the bar 60, the snatch pawls 37 will become disengaged from the power-roll 38 substantially after the type-bars have been power-driven equally near the platen 14 and that the printing-force stored up in the type-bars is also substantially equal. All type-bar impressions made in any adjusted position of the bar 60 will therefore be uniform. Subsequent to the disconnection of the snatch-pawl 37 from the snatch-roll 38, each type-bar continues by momentum toward the platen to make an imprint and the driving-link returns immediately to normal position and is ready for another power-actuation. The associated type-bars 11, links 19 and levers 21 are quickly returned to normal position by individual springs 29 attached to the lower lever-ends. The dot-and-dash line representing the lever 21 in Figure 2 indicates the extreme operated position thereof and it should be understood that the springs 36 always effect the return of the arms 28 ahead of the return to normal position of the levers 21.

As has been pointed out before, the levers 21 extend upwardly and their lengths are varying. The centrally disposed levers 21 in the machine are the shortest and the levers disposed increasingly nearer to the sides of the machine are longer, see Figure 3. The foremost lever 21 in Figure 1 represents a short, that is, centrally disposed lever and the rolling surface 30 of the arm 28 contacts the rolling-surface 27 on the lever 21 initially at 68 to exert a desired initial leverage upon the lever at the beginning of each power operation. The contact between the rolling surfaces 27 and 30 progresses downwardly during the power operation of the arm 28, nearer to the lever pivot 23, to accelerate the motion of the connected type bar. The rolling-surfaces on the more outwardly disposed arms 28 have initial contacts with the levers that are increasingly further away from their pivots, as seen in Figure 1, to compensate for the increasing lengths of the more outwardly disposed levers 21. The rolling-contacts of the various associated surfaces 27 and 30 progress downwardly during the operation of the various type-bars at such rates that similar part-movements of the driving links will result in similar movements of the type-bars toward the platen.

In the form of the invention shown, the arms 28 are in every respect equal and their positions are normally gauged against a face 70 provided upon the cross bar 33. The rolling surfaces on the levers 21 only are individually designed or formed to give the desired uniformity in the power operation and acceleration of all type-bars. It should be noted that the machine of the present invention can be manufactured economically because of the relatively few different parts con-

tained in the machine. The corresponding type-action parts can be manufactured by the use of the same tools except the levers 21 which require different tools.

Any individual screw 59 may be adjusted to slightly vary the extent of power-operation of the associated type-bar from the other type-bars. A type-bar having a small type-surface, for example, may be given a little shorter power-operated movement toward the platen than a type-bar having a larger surface. Slight irregularities in the power-movements of the type-bars toward the platen due to inaccurately manufactured parts may also be corrected by adjusting one or more of the screws 59.

The power-driven movement of all type-bars is regulated collectively by the adjustment of said abutment-bar 60 to give substantially equal power-driven movements to the type-bars, which movements may range from approximately one-third power-operation to nearly full power-operation. Subsequent to the disengagement of the snatch-pawl 37 from the power roll, the operated type-bar continues by momentum toward the platen while the driving link 34 and the associated arm 28 returns promptly to normal position. The type-bars rebound freely and quickly from the platen independent of the return of the driving-members 34. The characters typed are therefore more perfect and sharp in outline due to the speedier rebound of the types away from the platen. Because of the relative early return of the driving-links 34 to normal position, the return of the type-bars is more lively and the type-bars may therefore be power-operated in quick succession without the clashing of the neighboring bars.

The usual curved universal bar 73 is engaged by each type-bar just before the type-bar reaches the platen. This universal bar is used to quickly actuate a carriage-feed escapement, not shown, at the instant of type-impact. The invention provides that another universal bar 74 be operated by downwardly extending arms 75 integral with the levers 21. This universal bar 74 is operated independent of the return of the driving link 34 to normal position, during the full type-bar movement toward the platen. The universal bar 74 is pivoted at 76, and connected to a ribbon-feed mechanism and a ribbon vibrating mechanism of standard construction, not shown. It is desirable to operate the ribbon vibrating mechanism comparatively slowly during the full type-bar movement toward the platen to prevent momentary flexing of delicate ribbon vibrating parts and to prevent momentary crumpling of the ribbon. This is especially true when a two-color ribbon is employed so that the typing-field on the ribbon is extremely narrow. The arms 75 contact the universal-bar at varying lengths so that the universal bar 74 will receive a uniform movement from all the levers 21 irrespective of their varying angular movements. The universal bar 74 is provided with tongues 72, one opposite each of the lever-arms 75. These tongues 72 are individually bendable to compensate for slight differences in the throw of the lever-arms 75.

A plate 76 fastened upon the bar 33 by screws is provided with bendable tongues 77 to accurately and noiselessly limit the motions of the levers 21 to normal positions.

Each type-bar carries an upper-case type 79 and a lower-case type 80. The lower-case type 80 is shown contacting the platen in dot-and-dash lines in Figure 2. The segment may be case

shifted downwardly in any known way to bring the upper-case types 79 into register with the printing line upon the platen. The links 19 are connected to the levers 21 and the type-bars 11 for idle pivotal movement about their front-ends during case-shift movements of the type-bars as is indicated by the dot-and-dash lines in Figure 3.

What is claimed is:

1. In a typewriter, in combination, a type-bar, a lever connected thereto, means influencing said type-bar and said lever to rest position, power drive means, a substantially vertical arm adapted for rolling contact with said lever, an actuator link pivoted to said arm and extending horizontally therefrom, stationary abutment means against which the said arm and the said actuator link are normally positioned free of said power drive means, means movable to cause a transitory connection of the actuator link with the drive means whereby said arm is moved in rolling contact against the lever to impel said type-bar toward typing position, and resilient means for causing immediate return of the actuating link and said arm to normal position against the said stationary abutment means, after said transitory connection, in advance of and independent of the return of said type-bar and said lever to rest position.

2. In a typewriter having a frame and an array of operable type-bars, laterally spaced levers pivoted on a straight transverse frame-supported rod and having each an operating connection with one of said type-bars, a straight transverse array of power-actuating means for said levers parallelly adjacent to the array of levers, comprising, arms individually pivoted on another straight frame-supported rod, and pusher links pivoted to said arms, said arms being adapted for rolling contact with said levers for pushing said levers to operate said type-bars, a power operator, bar means on said frame against which said arms and said pusher links are positioned free of said power operator in normal positions, means for resiliently urging said arms and said pusher links to normal positions as determined by said bar means, and selectively operable means to cause a transitory engagement of any one of said pusher links with said power operator.

3. In a typewriter having a frame and an array of operable type-bars, a transverse array of laterally spaced levers pivoted on a straight transverse frame-supported rod, each lever having an operating connection with one of said type-bars, straight transverse array of power-actuating means for said levers parallelly adjacent to the array of levers, comprising arms individually pivoted on another straight frame-supported rod, and an actuator link pivoted to each arm, said arms being adapted for rolling contact with said levers for pushing said levers from normal to operated positions to operate said type-bars, a power operator, stop means on said frame against which said arms are normally positioned, a transverse bar on the frame against which said actuator links are normally positioned free of said power operator, spring means for urging said arms and said actuator links to normal positions as determined by said stop means and said transverse bar, and selectively operable means to cause a transitory engagement of any one of said actuator links with said power operator.

4. In a typewriter having a curved array of type-bars, laterally spaced levers, a straight axis

along which said levers are pivoted, said levers having operating connections with said type-bars at variant points from the said axis, wherefore said levers require different angular motions to operate said bars, a straight array of identical power-actuator means, each actuator means adapted for rolling contact with one of said levers, power drive means, means selectively operable to connect any actuator means to said drive means whereby a connected actuator means drives one of said levers in rolling contact to drive a connected type-bar toward typing position, means to disconnect a connected actuator means automatically before a driven type-bar reaches typing position, means for causing an immediate return of any actuator means responsive to disconnection, wherefore an actuator means starts to return while the printing movement of the type-bar is being completed by momentum, a universal bar, and motion-transmitting contacts between said levers and said universal bar located variously distant from said pivot axis wherefore said universal bar is operable to an equal extent by all the levers.

5. In a typewriter, a curved array of pivoted type-bars, an array of levers individually connected to said type-bars and pivoted to swing on horizontally transverse axes, means influencing said type-bars toward normal positions, a straight array of parallelly disposed pusher means adapted for individual rolling contact with said levers and reciprocable from and to normal positions, power operating means, means selectively operable to cause said power operating means to impart a single reciprocation to any one of the pusher means, said pusher means in moving from normal positions causing said type-bars to be impelled toward typing positions, the type-bars continuing by momentum to type and returning to normal positions uninfluenced by said pusher means.

6. In a typewriter, a curved array of pivoted type-bars, an array of levers individually connected to said type-bars and pivoted to swing on horizontally transverse axes, means influencing said type-bars toward normal positions, an array of parallelly disposed pusher means, including, a straight array of parallelly disposed pivoted arms adapted for individual rolling contact with said levers and a pusher actuator pivotally connected to each one of said arms and reciprocable to and from a normal position, power operating means, means selectively operable to cause said power operating means to impart a single reciprocation to any one of the pusher actuators, said pusher actuators in moving from normal positions causing said type-bars to be impelled toward typing positions, the type-bars continuing by momentum to type and returning to normal positions uninfluenced by said pusher actuators.

7. In a typewriter, a curved array of pivoted type-bars, an array of upright levers individually connected to said type-bars and pivoted to swing on horizontally transverse axes, means influencing said type-bars toward normal positions, a straight array of parallel arms, each pivoted for fore and aft movement and adapted to drive one of said levers by rolling contact therewith, parallel pusher actuators, one connected to each of said arms and reciprocable to and from normal position, power operating means, means selectively operable to cause said power operating means to impart a single reciprocation to any pusher actuator, said actuators in moving from

normal positions causing said type-bars to be impelled toward typing positions, the type-bars continuing by momentum to type and returning to normal positions uninfluenced by said pusher actuators.

8. In a typewriter, a curved array of pivoted type-bars, an array of levers mounted for fore and aft pivotal movements and connected to said type-bars, means influencing said type-bars toward normal positions, a straight array of parallelly disposed arms, each adapted to drive one of said levers by rolling contact therewith, a straight array of identical push-links individually pivoted to said arms, power drive means, means selectively operable to connect said push-links individually to said drive means for single actuations thereby to cause said type-bars to be impelled toward typing positions, means to disconnect said push-links prior to the type-bars reaching typing positions, the type-bars completing their typing movement by momentum, and means for returning said push-links responsive to disconnection so that the type-bars return to normal positions uninfluenced by said push-links.

9. In a typewriter, a curved array of pivoted type-bars, an array of levers mounted for fore and aft pivotal movements and connected to said type-bars, means influencing said type-bars to normal positions, a straight array of pivoted identical arms, each located behind one of said levers and adapted to drive it in rolling contact therewith, a straight array of push-links behind said levers and individually pivoted to said arms, power drive means, means selectively operable to connect said push-links individually to said drive means for single actuations thereby, to cause said type-bars to be impelled toward typing positions, means to disconnect said push-links prior to the type-bars completing their typing movements by momentum, and means for returning said push-links responsive to disconnection so that the type-bars return to normal positions uninfluenced by said push-links.

10. In a typewriter, a curved array of pivoted type-bars, a pivot rod, levers having upper ends connected to said type-bars and being pivoted at their lower ends upon said pivot rod, a straight pivot rod in back of and above said first pivot rod, an array of elements pivoted upon said straight rod, each adapted to drive one of said levers by rolling contact therewith, a straight array of parallel actuators pivotally connected to said elements, power drive means, means selectively operable to connect said actuators individually for single actuations to said power drive means to cause said elements to drive said levers and impel said type-bars toward typing positions, the type-bars completing their typing movements by momentum, and means for returning said actuators responsive to disconnection so that said type-bars return to normal positions uninfluenced by said actuators.

11. In a typewriter, a curved array of pivoted type-bars, an array of levers mounted for fore and aft pivotal movements and individually connected to said type-bars, means influencing said type-bars to normal positions, a straight pivot rod, a straight array of parallelly disposed arms individually pendent from said rod, each arm adapted to drive one of said levers by rolling contact therewith, a straight array of horizontally extending parallel actuators individually pivoted below said pivot rod to said arms, power drive

means, means selectively operable to connect said actuators individually to said drive means for single actuations thereby to cause said type-bars to be impelled toward typing positions, means to disconnect said actuators prior to the type-bars reaching typing positions, the type-

bars completing their typing movements by momentum, and means for returning said actuators responsive to disconnection so that said type-bars return to normal positions uninfluenced by said actuators.

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