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R. VON REPERT
TYPEWRITING MACHINE

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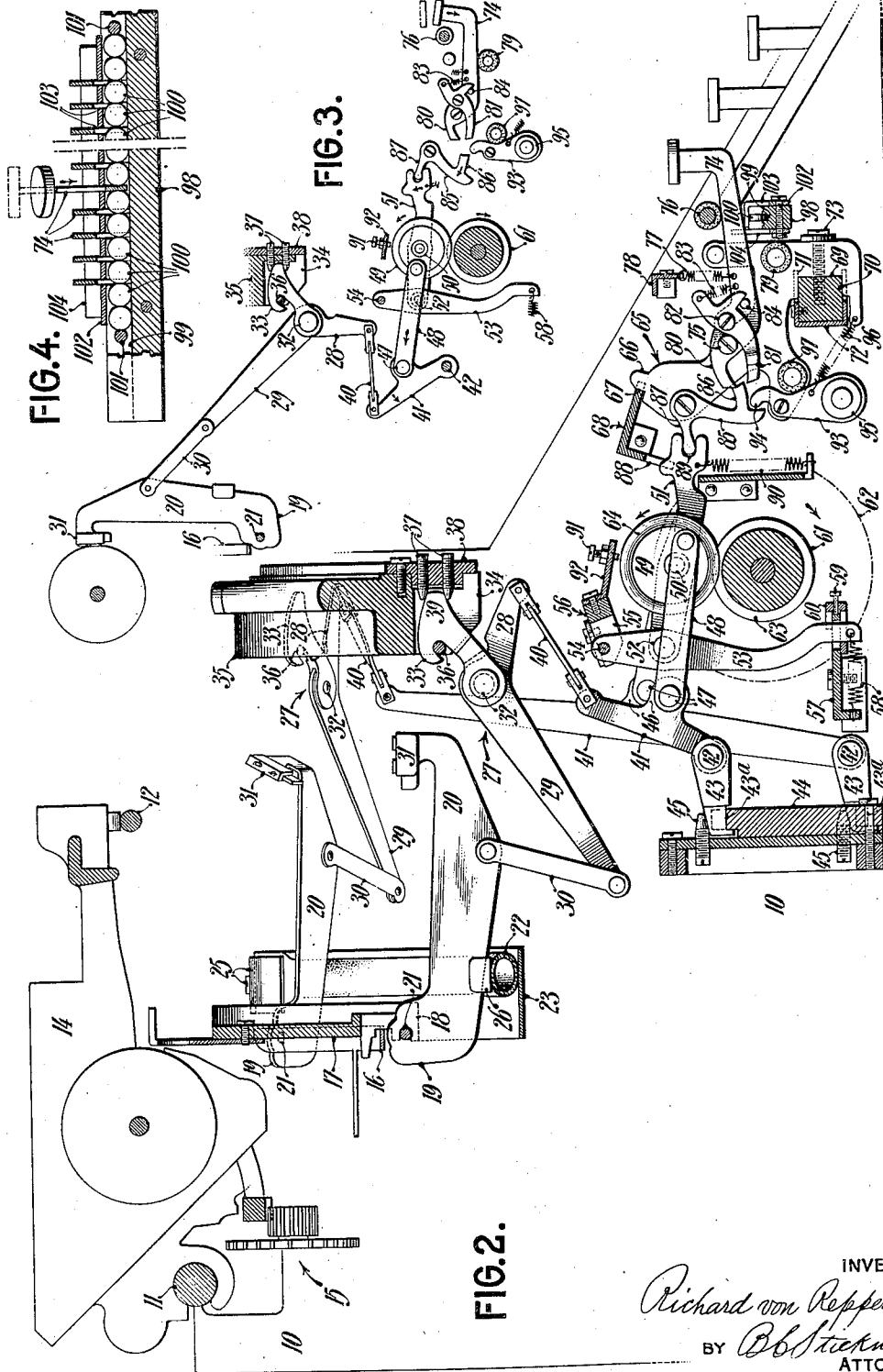


FIG. 2.

FIG. 3.

FIG. 4.

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TYPEWRITING MACHINE

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31 Claims. (Cl. 197—17)

The present invention relates to typewriting machines of a class employing a noiseless type-bar mechanism operated by a noiseless power-driving mechanism controlled by the depression of keys.

In my patent of April 30, 1929, No. 1,710,751, a type-bar-printing system includes key-driven toggling links operable to raise horizontally-disposed type-bars from a state of rest for an initial slow movement, accelerate this movement for a high velocity of speed, and finally convert this high velocity by a link-controlled deceleration, into a type-impressing pressure, rather than an uncontrolled type-impact or concussion.

One object of the present invention provides a coupler between each type-impressing linkage and a power-driven roller; each coupler controlled by a key to noiselessly engage the roller for a silent rotary transmission of a link-driving cycle of motion.

Further objects include a key-control for the coupler to prevent a double actuation thereof from a single depression of a key; the division of the mechanism intermediate the keys and the type-bars into two separate trains of mechanism, one train including a type-bar, its linkage and a coupler, bench-assembled as a type-bar unit and assembled into the machine-frame as a stock-unit, and another train including a key and coupler-controlling parts preassembled as a stock key-unit and assembled into the machine-frame to co-operate with the type-bar unit for an economical assembly; and to provide each type-bar with a positive control by the linkages during the swing of the type-bar from the pad to the platen and back, as distinct from the usual method of releasing the control of the type-bar from the roller at the printing position to be idly restored by a spring. This positive control of the type-bar prevents blurring of impressions due to the uncontrolled rocking of the types at the printing position and while the toggling pivots are in alignment, and also prevents clashing of the type-bars at the pad position by removing all rebound from the bars.

A further object provides suitable micrometric adjustments at major pivotal points of each type-bar linkage to insure a uniform typing pressure and characters of uniform density irrespective of the velocity of the driving element.

Other features and advantages will hereinafter appear.

In the accompanying drawings,

Figure 1 is a fragmentary view of some of the parts of an Underwood typewriter and other co-

operating parts forming the subject-matter of this invention, shown in perspective, and with some parts broken away and sectioned for clearness.

Figure 2 is a fragmentary vertical section approximately through the longitudinal center of the machine, showing a type-bar linkage and its key-unit in normal position.

Figure 3 is a diagrammatic view of the printing parts as when a key is fully depressed and its type-bar has been raised to the platen by the drum-driven coupler and the pressure impact of the type against the platen is augmented by the straightening-out linkages of two separate toggling elements, one toggle at the type-bar and the other toggle at the coupling, and both toggles timed to operate in unison for a common end.

Figure 4 is a detailed section of a cross-bar of the frame that houses a series of divided elements arranged end to end to prevent the joint depression of two keys.

The Underwood typewriting machine includes a frame 10 that supports two parallel rails 11 and 12 for a carriage 14 to ride upon under the influence of a motor not shown, but controlled in a carriage-feeding direction, by parts generally indicated by 15, and operated by a universal bar 16 on a segment-plate 17. The segment-plate 17 is slotted radially at 18 to receive shanks 19 of type-bars 20 mounted upon a segment-wire 21 common to the whole series of bars. The type-bars 20 normally rest upon a pad 22, which in the present instant may be a rubber-tube section supported by a curved plate 23 secured to the frame 10 by screws 24 and to which the tube may be secured by clips and screws 25 at each end of the tube-section. This provides a convenient and effective pad to establish a normal position for the type-bars and each type-bar may have a shoe 26 to strike the pad.

Each type-bar 20 may be operated by a bell-crank 27 that includes a short arm 28 and a long arm 29 connected by a link 30 with the type-bar between the pivot 21 and the type-block 31. Each bell-crank 27 may be permanently mounted upon a pivot 32 secured to a hanger-blade 33 arranged to enter an open slot 34 in a front segment-plate 35 to hook over a fulcrum-wire 36 and be adjustably held thereupon by a pair of miter-pointed screws 37 threaded through a slot-covering front plate 38 to engage a round nose extension 39 of the hanger to throw the pivot 32 of the hanger in one of two directions.

The short arm 28 of the bell-crank 27 is joined by a link 40 with a vertically-disposed rocker-arm

41 suspended above a pivot 42 carried by a hanger-arm 43 set into an open slot 43^a in a plate 44 and locked therein by a suitable screw as 45.

The rocker-arm 41 may be formed with an ear 46 to support a stud 47 that gives a pivotal support for one end of a pitman 48 connected at its opposite end to a disk-element or coupler 49, rotatable about a center 50 that is eccentric to the periphery of the disk. The center 50 of the disk 49 may be a stud secured to a lever 51 suspended horizontally as with one end pivotally hung upon a stud 52 secured to a lever 53 and the opposite end supported by means presently to be described.

The lever 53 may be suspended upon a wire 54 common to all the levers and each lever assembled within a locating slot 55 in a bar 56 extending across the machine and secured to the frame 10. The lower end of the lever 53 may be guided by a slotted comb-bar 57 common to all the levers and controlled in one direction by a spring 58 and controlled in the opposite direction by a jack-screw 59 operating through a clip 60, to draw the lever forwardly against the heavy tension of the spring 58. The adjustment of the jack-screw 59 and the lever 53 will adjust the relative position of the disk 49, for purposes to appear.

The center type-bar with its train of linkages has been described together with the means for supporting it within the machine, and indicates a type-bar unit, assembled as a unit and not as individual parts assembled and adjusted piecemeal. The other type-bars and linkages are duplicates except for the arms 41 which must necessarily vary in length as their type-bar positions ascend the sides of the segment, to maintain uniform transmission of leverages.

The disk 49 of each type-bar train may be regarded as a coupler or a means for coupling its train with a source of power for the actuation of its type-bar, and because the type-bar action is noiseless in character by the elimination of the noisy click of type-bar concussions, the coupling of the rotary disk 49 to a rotating body for a rotary transmission of power eliminates the click of the conventional method of interlocking a hooked type-bar-driving element with a rotating toothed member.

The driving element may be a roller 61 driven by a constant source of power, such as an electric motor 62, and formed with spaced-apart grooves 63. Each groove may be formed with inclined side walls having an included angle of 15 degrees, and each disk 49 formed with similar angular faces 64 to promote a clutching engagement with the rotating grooves.

To control the operation of each type-bar train, each coupler 49 is brought into clutching engagement with its groove 63 by a key-control unit individually mounted as a unit to interlock with each type-bar train. Each key-unit may include a bracket 65 punched out of sheet-metal to form an extension 66 to enter a locating slot 67 in the edge of an angle-bar 68 secured at each end to the side frames of the machine and also formed with an open slot 69 to fit snugly upon a cross-bar 70 and enter locating slots 71 in the edges of a U-shaped channel-bar 72 permanently secured to the bar 70. This construction provides for a series of punched-out open slots 71 to guide and locate each bracket 65 upon the bar 70 and in alignment with the grooves 67 in the angle-bar 68 and without more expensive milling operations. Each adjoining pair of brackets 65 may be se-

cured in position upon the bar 70 by a single screw 73 threaded into the bar and between the brackets.

Each bracket 65 carries a key-lever 74 fulcrumed upon a screw or stud 75 in the bracket and held in normal raised position against a cushioned stop-rod 76, by a spring 77 secured to a spring-bar 78 and provided with a cushioning-stop stud 79 to arrest the down stroke of the key. The free end of each key 74 may be formed with a holding dog or pawl 80, and the key may also have a latching dog or pawl 81, pivoted at 82 upon the key, and tensioned at 83 against a stop 84, also on the key. Each bracket 65 also pivotally supports a bell-crank lever 85 having a tongue 86 normally engaging the dog 80 and an arm 87 to project rearwardly beyond the bracket 65.

The free ends of the levers 51 extend forwardly of the plane of the roller 61 to be guided by suitable slots in a comb 88 formed in the bar 68. To provide a separable interlock with an arm 87 at the end of a key-train and a lever 51 at the beginning of a type-bar train, each lever 51 is slotted at 89 to receive the rounded end of an arm 87.

Each lever 51 has a spring 90 tensioned to draw the lever and its coupler 49 towards the roller 61, but the normal relation of the key-train of parts to the type-bar train of parts is to prevent the coupler 49 from engaging the roller 61 because of the interception of the bell-crank tongue 86 by the dog 80 of the key-lever 74.

The depression of a key-lever 74 raises its dog 80 out of the path of the tongue 86 and the tongue will swing over the dog 81 and thus release the lever 51 to the tension of the spring 90 and drop the coupler 49 into frictional engagement with its groove 63 in the rotating roller 61.

The rotation of the coupler 49 from the position of Figure 2 to that of Figure 3, conveys a reciprocation to the arm 41, and for the last half of its type-bar-driving movement has a decelerating action of great power, due to the swinging of the pivots of the pitman 48 into a dead-center alignment with the axis 50 of the roller 61. This dead-center translation for the pitman 48 is timed to the straightening out of the two toggling parts 29 and 30 in the same train of transmitting parts. Hence there are in each type-bar train two separate translations of energy into type-pressing power against the platen.

The rotation of the coupler 49 through a cycle of motion vibrates the lever 51 and rocks the bell-crank 85 to swing the tongue 86 out of engagement with the two dogs 80 and 81, and if the depressed key-lever 74 is released by the finger before the coupler fully cycles, the tongue 86 will be restored to its normal position against the dog 80.

In the event that the finger is late in releasing the depressed key, the dog 81 will be in the path of the returning tongue to arrest the cycling disk 49, and when the key is subsequently released, the dog 80 will swing into the path of the tongue 86, before the tongue is released by the dog 81. This is one method of preventing only one type-bar impression for each depression of a key.

To prevent overthrow of the couplers 49 and always arrest them at a uniform initial position, braking elements of some nature may be required for each coupler. Such a device may include adjustable screws 91 to bear lightly against the edges of the couplers 49, as by adjustably threading said screws through a plate 92 secured to the cross-bar 56.

The sudden key-release of levers 51 and the accompanying sudden droppings of the hard

couplers into the softer grooves of the roller 61 may cause an uneven or jerky translation of motion; hence a cushioning means to gradually check this sudden release of the lever 51 may be had as with a lever 93 pivoted upon the bracket 65 with a very short arm 94 to engage the released bell-crank 85 and, through the long weighted end 95 of said lever, soften the engaging blow of its coupler under the reaction of a spring 90, or the lever 93 may have a spring 96 substituted for the weight, to normally hold the lever against a padded stud 97.

In all power-driven machines, means are provided to prevent the joint depression of two keys. To this end, a cross-bar 98 is supported by the frame and provided with a longitudinal groove 99 within which are arranged a series of small, thin rolls 100 end to end, to roll freely within the groove between two end stop-pins 101. There is one roll between two adjoining key-levers 74, as shown at Figure 4, and the free displacement of the rolls between the two pins 101 is equal only to the thickness of one key-lever. To maintain the rolls within the groove 99, a covering plate 102 may be secured to the bar 98 and provided with clearance slots 103 for the passage of any key 74 between the rolls 100. The keys may further be provided with a comb 104 secured to the bar 98.

It being assumed that the type-bar units and the key-lever units have been previously assembled for stock-units, the assembly of such a type-bar train to the machine-frame includes, first, the assembly of the type-bar 20 within a slot 18 in the segment 17, and the end of the segment-wire pushed around an open groove in the Underwood segment and through the pivot-hold in the type-bar. The hanger 33 may be hooked upon the wire 36 in the front segment 35 and the two screws 37 threaded therein to secure the hanger 43 to the plate 44, and the lever 53 adjusted upon the pivot-wire 54 and passed through its guide-slot in the bar 57. As the coupler 49 is permanently secured to both the pitman 48 and the lever 51, the adjustment of the coupler to a groove 63 and the lever 51 to a slot in the bar 68 is a joint operation and completes the assembly of the type-bar unit.

In permanently adjusting this assembled type-bar unit for printing, the type-bar may be raised to the typing position against the platen as shown at Figure 3, and the threading of the screws 37 in or out of the plate 38 rocks the hanger 33 about its pivot 36 and determines the degree of pressure transmitted by the toggle 29—30 for the type-face against the platen. The lever 53 may now be adjusted by the jack-screw 59 to bring the pitman 43 into alignment between the stud 47 and the center 50 for a second toggling effect timed with the toggling of the parts 29—30.

The assembled key-lever unit may now be adjusted to the bar 70 and into a locating slot 67 of the bar 68, to place the arm 87 into operating interlock within the slot 89 in the lever 51.

Variations may be resorted to within the scope of the invention, and portions of the improvements may be used without others.

Having thus described my invention, I claim:

1. In a typewriting machine, the combination with a power-driven shaft, of a type-bar-operating train having a revoluble coupler, key-controlled means to bring the coupler into frictional engagement with the shaft, and a positive train of type-bar driving and returning mechanism, said train being positively decelerated by said

coupler, and including a toggle caused to be straightened out by the coupler, means being provided to limit the cycling movement of the coupler to a single revolution, said train bringing the type-bar to print without concussion, and said train being returned by said coupler. 80

2. In a typewriting machine having a platen, the combination with a power-driven shaft, of a rotary driver connectible to said shaft to be cycled thereby through a single revolution, and a type-bar train connected to said driver to be cycled thereby and constantly controlling the type-bar, to carry it to the platen and also back to normal position. 85

3. In a typewriting machine having a platen, the combination with a power-driven shaft, of a rotary driver connectible to said shaft to be cycled thereby through a single revolution, and a type-bar train connected to said driver to be cycled thereby and constantly controlling the type-bar, to carry it to the platen and also back to normal position, the type-bar being always positively connected to said rotary driver by means of said train and being decelerated as the type approaches the platen, said train being connected to a wrist upon said driver, and said wrist reaching dead-center in respect to said train as the type-bar contacts with the platen, to secure quiet impression of the type. 90

4. In a typewriting machine having a platen, the combination with a power-driven shaft, of a rotary driver connectible to said shaft to be cycled thereby through a single revolution, and a type-bar train connected to said driver to be cycled thereby and constantly controlling the type-bar, to carry it to the platen and also back to normal position, the type-bar being always positively connected to said rotary driver by means of said train and being decelerated as the type approaches the platen, said train being connected to a wrist upon said driver, and said wrist reaching dead-center in respect to said train as the type-bar contacts with the platen, to secure quiet impression of the type, said train including a toggle which straightens out as the type approaches the platen, whereby the speed of the type is further decelerated at the concluding portion of its printing stroke; said driver continuing its rotation and thereby reversing the movement of said toggle, to bring the type-bar back to normal position, whereby double printing of the type is avoided, and celerity of return of the type is secured, to make room for the approach of the succeeding type to the platen, in rapid operation of the machine. 95

5. In a typewriting machine, the combination with a power-shaft and a type-bar, of a driving train for the type-bar, said train having a revoluble coupler, and a key having means to bring the coupler into smooth driving engagement with the shaft, to be cycled thereby through a mechanically-limited single revolution, said train including a toggle which is positively straightened and also decelerated by the coupler during the first half of the revolution of the latter, the remaining part of the cycling of said coupler operating through said train to force the type-bar back to normal position; means being provided for disconnecting the shaft and coupler at the conclusion of the cycling of the latter. 100

6. In a typewriting machine having a platen, the combination with a power-driven shaft, of a rotary driver connectible to said shaft to be cycled thereby through a single revolution, a type-bar train connected to said driver to be cycled there- 105

- by and constantly controlling the type-bar, to carry it to the platen and also back to normal position, and means for automatically disabling the driver at the conclusion of its cycling independently of the key, to prevent repeated impressions being caused by the held-down key.
7. In a typewriting machine, the combination with a series of type-bars, each bar having a coupler and a power-driven roller operable to cycle any coupler, of toggling mechanism connecting each coupler with its type-bar, and operable to translate the cycling of a coupler into a positive type-bar reciprocation and print by a pressure derived from the straightening out of a toggle, means to selectively bring any coupler into engagement with the roller to be cycled thereby, said means including a coupler-suspending mechanism released by a key, and means engaged by said coupler-suspending mechanism, when released by the key, to delay the frictional engagement of the coupler with the roller to soften the initial start of the coupler.
8. In a typewriting machine having a platen, the combination with a series of type-bars, of power-means for operating said type-bars, including a single-revolution coupler for driving each type-bar and a power-shaft connectible to the couplers selectively, means being provided to enable the power-shaft to cycle any coupler through a mechanically-limited single revolution, and toggling trains connecting the couplers with their type-bars respectively, each train operable to convert the cycling of its coupler into a positive drive of the type-bar to the platen, followed by a positive drive of the type-bar back to normal position; the type-bar impressions being quietly made by pressure due to deceleration.
9. In a typewriting machine, the combination with a constantly-rotating roller and a type-bar having a rotatable coupler brought into frictional engagement with the roller by the depression of a key, of a positively driving and positively returning train of transmitting mechanism permanently and positively connected to the type-bar and to the coupler, said train including a toggle operable by each cycle of the coupler to positively drive the type-bar and positively decelerate it to print without concussion, and also positively restore the type-bar to a state of rest at the end of the cycle of the coupler.
10. In a typewriting machine, the combination with a constantly-rotating roller and a type-bar having a rotatable coupler brought into frictional engagement with the roller by the depression of a key, of a train of transmitting mechanism permanently pivoted to the type-bar and to the coupler, to enable the latter to decelerate the train in the last part of the printing stroke, said train including a toggle operable by each cycle of the coupler to augment the deceleration and positively drive the type-bar to print without concussion, and means for supporting said train having adjustments to control the pressure of the type-bar for printing.
11. In a typewriting machine, the combination with a constantly-rotating roller and a type-bar having a rotatable coupler brought into frictional engagement with the roller by the depression of a key, of a train of transmitting mechanism permanently pivoted to the type-bar and to the coupler, to enable the latter to decelerate the train in the last part of the printing stroke, said train including a toggle operable by each cycle of the coupler to augment the deceleration and positively drive the type-bar to print without concussion, and means to automatically release the coupler from the roller at the end of its cycle.
12. In a typewriting machine, the combination with a constantly-rotating roller, a type-bar, a cycling coupler, and a key, of a train of pivotally connected toggling mechanisms having one end of the train permanently and pivotally connected to the type-bar and having the other end permanently and pivotally connected to the coupler, in such manner as to be positively decelerated thereby, during the cycling of the coupler, into engagement with the roller, to drive the train of mechanisms and the type-bar, the throw of the type-bar straightening out one toggle of said train to augment the deceleration effected by the coupler and prevent printing concussion of the type.
13. In a typewriting machine having a power-driven roller and type-bars operable to strike the front of a platen, the combination of means for separately driving each type-bar against the platen for pressure without concussion, said means including a train of connected mechanisms having a toggle, and a cycling coupler connectible with the roller and having connection with said train effective for positively decelerating the train, during the cycling of the coupler, the coupler when cycled by the roller straightening out the toggle for a further deceleration of its type-bar to print.
14. In a typewriting machine having a power-driven roller and type-bars operable to strike the front of a platen, the combination of type-bar-operating means intermediate each type-bar and the roller, including a train of mechanism pivotally connected with each type-bar and pivotally connected with a rotatable coupler, and controlling the printing and return strokes of the type-bar, and means to bring each coupler into engagement with the roller to be cycled thereby and positively operate its type-bar-operating means to print with a decelerated speed and an increased pressure and without concussion.
15. In a typewriting machine, the combination with a power-driven roller, a series of type-bars to strike the front of a platen, a series of normally-inoperative cycling couplers, one coupler for each type-bar, and a series of key-levers, one lever for each coupler and operative when depressed to bring its coupler into engagement with the roller to be cycled thereby, of a series of trains of mechanisms, each train positively connecting a type-bar with its coupler in such manner as to be positively decelerated by the coupler, during the engagement of the coupler with the roller, and each train including a driving toggle straightened out by the throw of the type-bar to augment the type-bar deceleration and prevent concussion thereof against the platen.
16. In a typewriting machine, the combination with a power-driven roller and a type-bar for striking the front of a platen, of means for driving the type-bar against the platen, including a train of mechanism having one end connected with the type-bar and having a driving coupler positively connected with the other end of the train so as to decelerate said train, during engagement of said coupler by said roller, said coupler being connectible with the roller to be rotated thereby, and further means included in the train operable by the cycling of the coupler to forcibly decelerate the type-bar to cause it to print against the platen with increased pressure and without concussion.

17. In a typewriting machine having a platen, the combination with a power-driven shaft, of a rotary driver connectible to said shaft to be cycled thereby through a single revolution, a type-bar train connected to said driver to be cycled thereby and constantly controlling the type-bar, to carry it to the platen and also back to normal position, and key-controlled means for selectively bringing any driver into frictional engagement with the power-shaft which is cycled thereby.

18. In a typewriting machine having a platen, the combination with a power-driven shaft, of a rotary driver connectible to said shaft to be cycled thereby through a single revolution, a type-bar train connected to said driver to be cycled thereby and constantly controlling the type-bar, to carry it to the platen and also back to normal position, and key-controlled means for selectively bringing any driver into frictional engagement with the power-shaft which is cycled thereby, the key-controlled means including a coupler-disconnecting mechanism releasable by each key.

19. In a typewriting machine, the combination with a constantly-rotating shaft, of a type-bar, a rotatable coupler having a wrist and brought into frictional engagement with the shaft by the depression of a key, and a train of type-bar-driving mechanism forming a positive connection from the coupler-wrist to the type-bar, to control acceleration and deceleration thereof positively during the printing stroke.

20. In a typewriting machine, the combination with a constantly-rotating shaft, of a type-bar, a rotatable coupler having a wrist and brought into frictional engagement with the shaft by the depression of a key, and a train of type-bar-driving mechanism forming a positive connection from the coupler-wrist to the type-bar, to control acceleration and deceleration thereof positively during the printing stroke, said train including a toggle operable by the coupler-wrist to positively drive the type-bar to augment its deceleration, and cause printing without concussion.

21. In a typewriting machine, the combination with a platen, of a system of type-bars mounted to strike at a common printing point, a power-shaft, a system of key-trains connectible individually to the power-shaft to operate the selected type-bar, each train including a revoluble coupler brought into driving connection with the power-shaft by means of its key, said coupler having a crank-wrist, and means positively connecting each type-bar to its wrist to be driven thereby to the platen and to be immediately withdrawn thereby from the platen.

22. In a typewriting machine, the combination of a platen, a system of type-bars mounted to strike at a common printing center, a power-shaft, and a system of type-bar-controlling trains for enabling the power-shaft to operate the type-bars selectively, each train including means actuated by said power-shaft to positively drive the type-bar to the printing point and to positively drive the type-bar away from the printing point.

23. In a typewriting machine, the combination of a platen, a system of type-bars mounted to strike at a common printing center, a power-shaft, and a system of type-bar-controlling trains for enabling the power-shaft to operate the type-bars selectively; means being actuated by said power-shaft to positively move the type-bar to the printing point and to positively move the type-bar away from the printing point; said

means including a one-revolution coupler which is positively connected to the type-bar to control its motion at all points.

24. The combination of a system of type-bars, a system of driving toggles therefor, each toggle including a pivoted arm, a system of levers connected by links to said pivoted arms, a system of pitmans pivoted to said levers to drive the same, a system of revoluble cycling couplers positively pivoted to said pitmans, a power-shaft, and key-mechanism for connecting said couplers frictionally to said power-shaft for cycling the same.

25. The combination of a system of type-bars, a system of driving toggles therefor, each toggle including a pivoted arm, a system of levers connected by links to said pivoted arms, a system of pitmans pivoted to said levers to drive the same, a system of revoluble cycling couplers positively pivoted to said pitmans, a power-shaft, and key-mechanism for connecting said couplers frictionally to said power-shaft for cycling the same, said type-bars having a radial arrangement relatively to the printing point, said toggles working in the radial planes of the type-bars, and said levers upstanding and pivoted at their lower ends, and having said links attached thereto at the upper ends of the levers.

26. The combination of a system of type-bars, a system of driving toggles therefor, each toggle including a pivoted arm, a system of levers connected by links to said pivoted arms, a system of pitmans pivoted to said levers to drive the same, a system of revoluble cycling couplers positively pivoted to said pitmans, a power-shaft, key-mechanism for connecting said couplers frictionally to said power-shaft for cycling the same, radial brackets upon which said toggle-arms are individually mounted, each bracket having the form of a detachable lever hung upon a fulcrum-pin, and adjusting screws for turning said bracket-lever around its pivot and fastening it where adjusted.

27. The combination of a system of type-bars, a system of driving toggles therefor, each toggle including a pivoted arm, a system of levers connected by links to said pivoted arms, a system of pitmans pivoted to said levers to drive the same, a system of revoluble cycling couplers positively pivoted to said pitmans, a power-shaft, key-mechanism for connecting said couplers frictionally to said power-shaft for cycling the same, radial brackets upon which said toggle-arms are individually mounted, each bracket having the form of a detachable lever hung upon a fulcrum-pin, and adjusting screws for turning said bracket-lever around its pivot and fastening it where adjusted, said bracket-levers mounted in radial slots, and said screws being threaded in a cap placed over said slots.

28. The combination of a system of type-bars, a system of driving toggles therefor, each toggle including a pivoted arm, a system of levers connected by links to said pivoted arms, a system of pitmans pivoted to said levers to drive the same, a system of revoluble cycling couplers positively pivoted to said pitmans, a power-shaft, key-mechanism for connecting said couplers frictionally to said power-shaft for cycling the same, said type-bars having a radial arrangement relatively to the printing point, said toggles working in the radial planes of the type-bars, and said levers upstanding and pivoted at their lower ends, and having said links attached thereto at the upper ends of the levers, said levers mounted upon brackets, a bar having slots in which the

brackets fit, and cone-pointed screws to engage inclined edges upon said brackets to crowd them into the slots.

29. The combination of a system of type-bars, a system of driving toggles therefor, each toggle including a pivoted arm, a system of levers connected by links to said pivoted arms, a system of pitmans pivoted to said levers to drive the same, a system of revoluble cycling couplers positively pivoted to said pitmans, a power-shaft, and key-mechanism for connecting said couplers frictionally to said power-shaft for cycling the same, each key having a lever upon which the revoluble coupler is eccentrically pivoted, a supporting arm for each lever, said supporting arm mounted upon a pivot to permit adjustment of the arm and lever, and means for holding the arm where adjusted.

30. The combination of a system of type-bars, a system of driving toggles therefor, each toggle including a pivoted arm, a system of levers connected by links to said pivoted arms, a system of pitmans pivoted to said levers to drive the same, a system of revoluble cycling couplers positively pivoted to said pitmans, a power-shaft, key-mechanism for connecting said couplers frictionally to said power-shaft for cycling the same, each key having a lever upon which the revoluble coupler is eccentrically pivoted, a supporting arm for each lever, said supporting arm

mounted upon a pivot to permit adjustment of the arm and lever means for holding the arm where adjusted, a spring tending to move said lever to carry the coupler into engagement with the power-shaft, a tumbler normally restraining said lever, and a key-controlled trigger normally restraining said tumbler and lever, and releasable by depression of the key.

31. The combination of a system of type-bars, a system of driving toggles therefor, each toggle including a pivoted arm, a system of levers connected by links to said pivoted arms, a system of pitmans pivoted to said levers to drive the same, a system of revoluble cycling couplers positively pivoted to said pitmans, a power-shaft, key-mechanism for connecting said couplers frictionally to said power-shaft for cycling the same, each key having a lever upon which the revoluble coupler is eccentrically pivoted, a supporting arm for each lever, said supporting arm mounted upon a pivot to permit adjustment of the arm and lever, means for holding the arm where adjusted, a spring tending to move said lever to carry the coupler into engagement with the power-shaft, a tumbler normally restraining said lever, and a key-controlled trigger normally restraining said tumbler and lever, and releasable by depression of the key, said coupler-carrying lever being movable up and down by the coupler.

RICHARD VON REPERT.

35	110
40	115
45	120
50	125
55	130
60	135
65	140
70	145
75	150