

Jan. 12, 1943.

T. H. TALLEY

2,308,461

NOISELESS ELECTRIC PRINTING MACHINE

Filed March 6, 1939

2 Sheets-Sheet 1

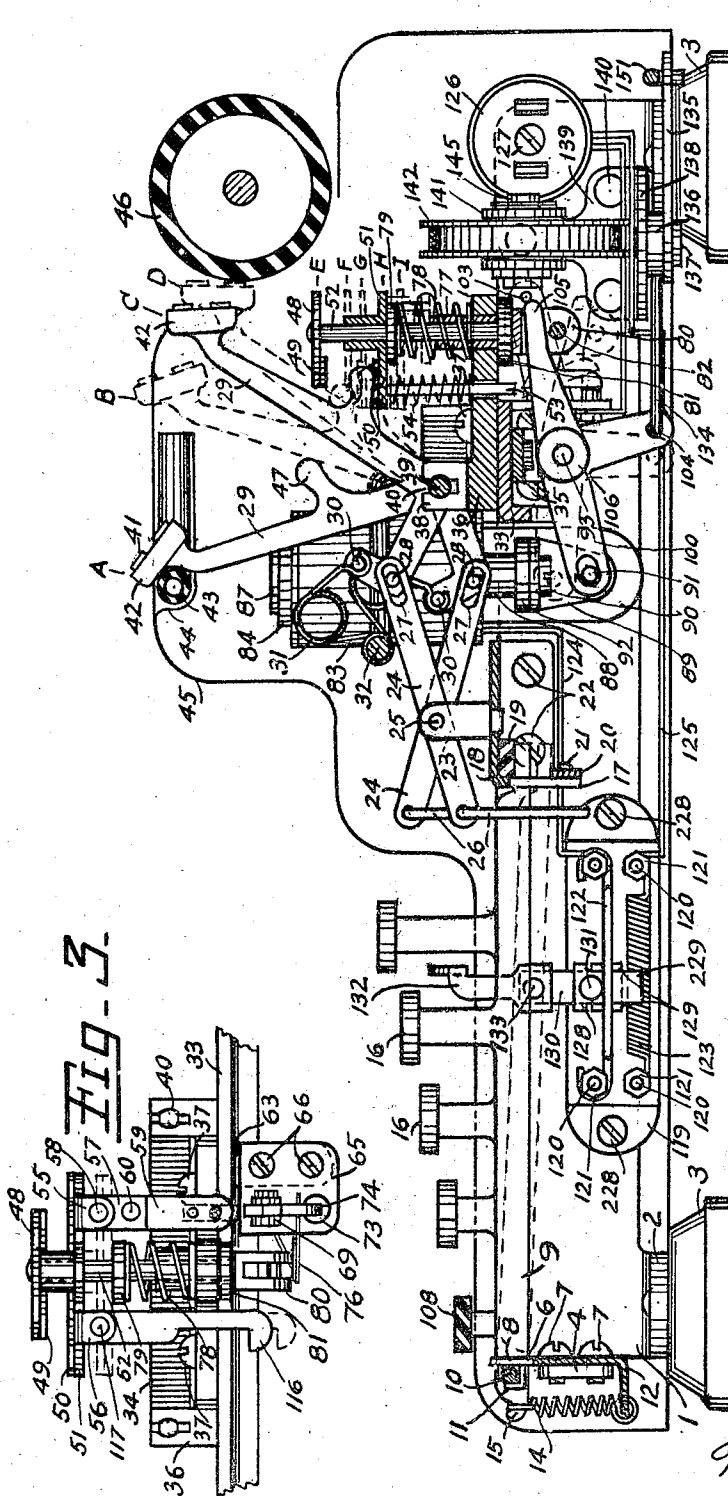


FIG. 1.

INVENTOR.

Thurmond H. Talley

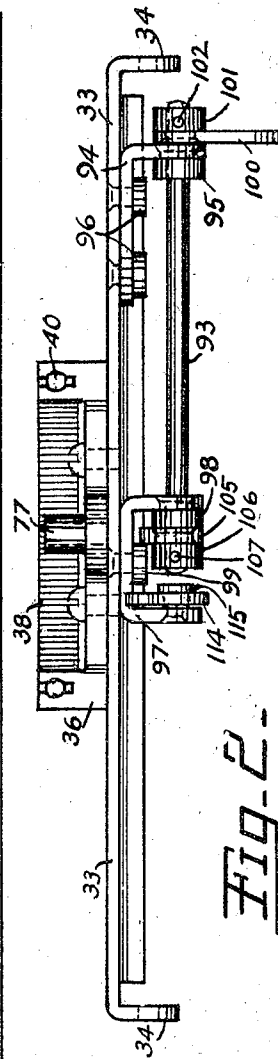


FIG. 2.

Jan. 12, 1943.

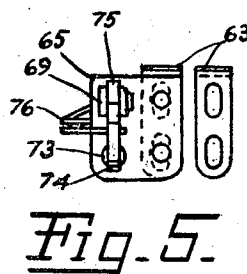
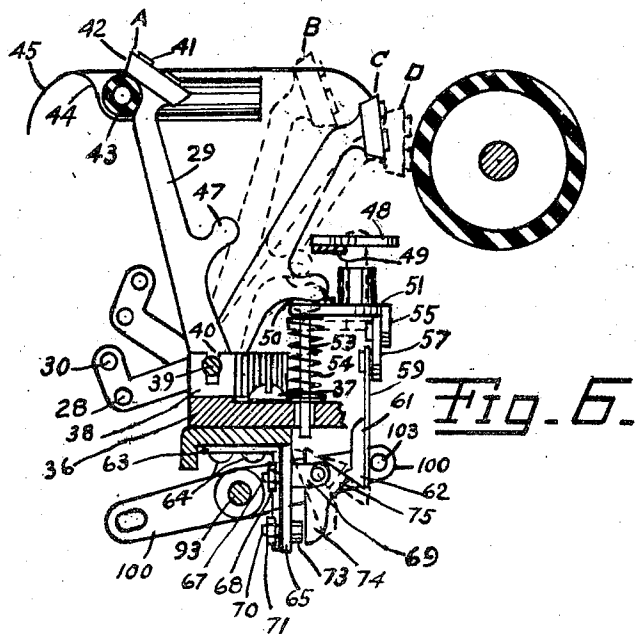
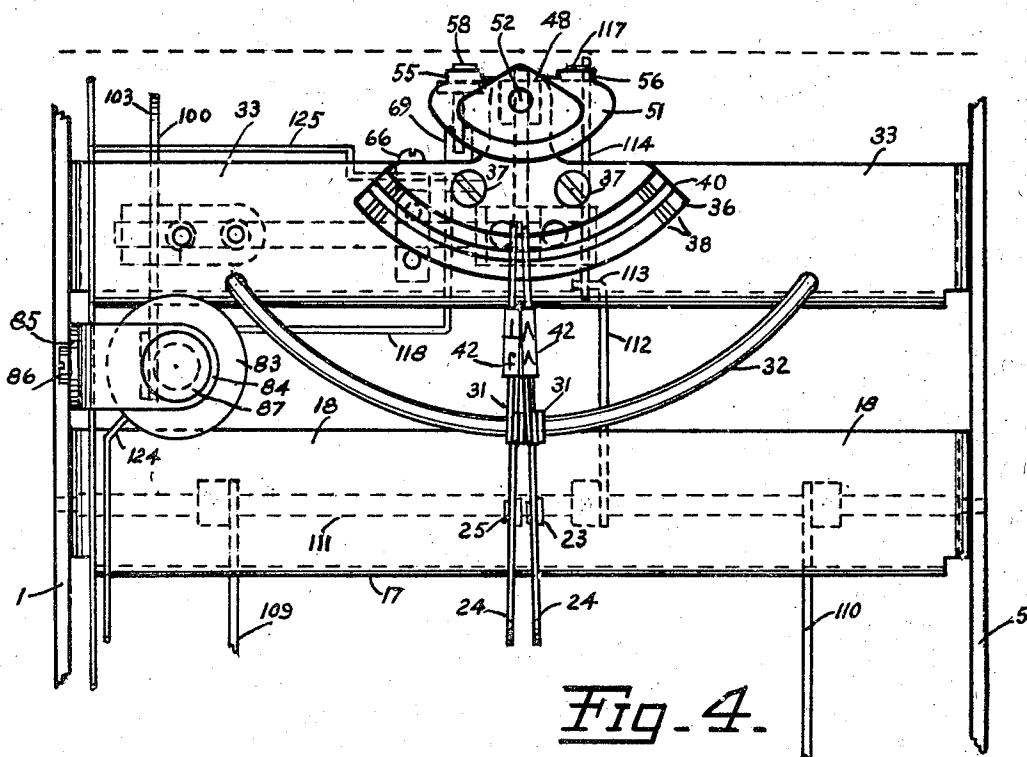
T. H. TALLEY

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2 Sheets-Sheet 2



INVENTOR.

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UNITED STATES PATENT OFFICE

2,308,461

NOISLESS ELECTRIC PRINTING MACHINE

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Application March 6, 1939, Serial No. 260,072

25 Claims. (Cl. 197—14)

This invention relates to silent or noiseless electric typing or printing machines and the like, and one object is to reduce the sharp click-click irritating noise produced by the impact of the type head on the platen in the printing action.

Another object is to employ quick acting electric impulses to do the heavy work of operating the machine to reduce fatigue and conserve the nerves and energy of the operator so that he can produce more work with greater accuracy.

Other objects are to increase the speed of the machine and the operator, and to give an even density of impressions of the type on the printed sheets and especially on the carbon copies.

Still other objects are to simplify construction thereby reducing the cost of manufacture, and to employ a type of power which allows the operator to maintain the accustomed rhythm or "feel" that he has become accustomed to on manually operated machines.

Still other objects are to produce a goodly number of clear carbon copies and cut stencils for duplicating machines by a short stroke and sharp impact to shake the carbon loose for clear impressions, a function not possible in the "squeeze method" type of silent machines, and also to provide a means to minutely regulate and control the power exerted upon the type bar, as excess power exerted upon the type bar means unnecessary noise.

In the accompanying drawings:

Figure 1 is a longitudinal sectional view showing a key and corresponding type-carrier or type bar at normal position and also shows the various stages of a type bar in action, or the different stages of the relayed stroke of the type bar.

Figure 2 is a rear view of the tie-bar support upon which is mounted the type-bar base and part of the type bar power-operating mechanism.

Figure 3 is a fragmentary view of the same tie-bar showing a rear view of the switch actuating mechanism, also a plan view of the switch.

Figure 4 is a plan view of the key actuating mechanism and associated parts.

Figure 5 is a plan view of the switch, also showing elongated holes in the switch support bracket to provide adjustment for the switch.

Figure 6 is a fragmentary view of the type bar and associated power-actuating mechanism showing how the movement of the type bar actuates the electric switch.

It is common practice in type-bar writing machines to effect printing by having the type bar travel a long continuous accelerated stroke

from the normal position of the type bar to the platen, and this long stroke is somewhat similar to the "slam" of a door, and the noise of the door "slam" has been successfully reduced by means of a "door-check" utilizing a relay principle. Therefore, a somewhat similar principle is incorporated in this mechanism to reduce the noise caused by the "slam" of the type bar against the platen. However, as the type bars must travel so fast, springs and similar mechanical means of the "door-check" would be entirely too slow. Therefore, in this machine the speedy electric impulse is utilized for the power-relayed short stroke, after the long stroke has been retarded.

The "squeeze-bar" method used in present forms of silent typewriters makes it difficult to produce a sufficient number of carbon copies, because it takes a slight impact to jar the carbon loose from its paper base; therefore, this machine provides a short, sharp impact to jar the carbon loose from its paper base, and a rheostat is wired in series with the electric magnet to provide means for minutely regulating the power exerted upon the type bar to the amount required for a clear impression of the type, also to eliminate excess power exerted upon the type bar, as the excess power causes unnecessary noise.

The foregoing and other objects of the invention, together with means whereby the same may be carried into effect, will best be understood from the following description of certain forms or embodiments thereof illustrated in accompanying drawings. It will be understood, however, that the particular construction described and shown has been chosen for illustrative purposes merely, and that the invention, as defined by the claims hereto appended, may be otherwise practiced without departing from the spirit and scope thereof.

1 and 5 are the side-frames having right angle projections 2 formed on the lower part thereof near each end, to which projections are secured rubber feet 3 to support the machine. The front ends of side-frames 1 and 5 are formed into right angle projections 4 extending inwardly, and a tie-bar or key-lever support plate 6 is interposed between the side-frames 1 and 5 and secured at each end to the inwardly extending projections 4 by means of screws 7. A series or a plurality of L shaped key lever spacing projections 11 are formed on the upper edge of the tie-bar or key-lever support plate 6 to space the key-levers properly, and these L shaped pro-

jections also form a support for the key-lever pivot wire shaft 10, the key-levers 9 being pivotally mounted on said pivot wire shaft between said L shaped projections. A hook member 15 is formed on the forward end of each key-lever 9 and a key-lever spring 14 is engaged on each hook member. On the lower edge of the tie-bar or key-lever support plate 6 is formed a forwardly extending flange 12 having a hole formed therein beneath each key-lever, and the lower end of each key-lever spring is engaged in its respective hole so that said spring will hold the associated key-lever in normal position. A manipulating key 16 is formed on each key lever 9, and the free ends of key levers 9 extend between teeth formed on comb-member 17, formed at right angles on a tie-bar 18, a resilient bumper 19 being secured to the upper portion of the comb member 17 and a key-lever stop 20 being secured to the lower part thereof by rivets or screws 21. The tie-bar 18 has right angles formed on each end thereof and is secured to side frames 1 and 5 by means of screws 22. Support-studs 23 are mounted on tie-bar 18 and levers 24 are pivotally supported on the upper ends thereof by rivets 25. Links 26 are carried by the forward ends of levers 24 and the free end of each key lever 9 is engaged in its respective link. A slot 27 is formed in the rearwardly extending portion of each lever 24 and a stud 28 mounted on an elbow-shaped arm of each type-bar 29 engages in said slot 27. A stud 30 is also mounted on the upper portion of the elbow-shaped arm of each type-bar 29 and is engaged by one end of a toggle-spring 31 the opposite end of which is pivotally supported on an arcuate pivot wire 32 arranged in a horizontal plane and having the ends thereof mounted in tie-bar 33. An angle is formed on tie-bar 33 to make it rigid, and right angle projections 34 are formed on both ends of said tie-bar with holes therein and secured to side frames 1 and 5 by means of screws 35. A type-bar supporting base-casting 36 is also supported on tie-bar 33 and secured thereto by screws 37, having slots 38 milled in said base-casting, and type-bars 29 are mounted in said slots and pivotally supported on pivot wire shaft 39 in a milled and broached slot 40. On the upwardly extending arm of type-bar 29 is mounted type 41 on type head 42, and type-head 42 rests against a resilient cushion 43 mounted in groove 44 in casing 45. 46 represents the platen that carries the paper to be printed upon. A means is provided for retarding the long stroke of type-bar 29 just before it strikes the platen 46 and also relaying or continuing the stroke to complete the printing action of the machine under electric power generated by an energized solenoid electric magnet, comprising a projection 47 formed on the pivotally supported type-bar 29, so that when type-bar 29 is started in motion toward platen 46, said projection 47 passes under striker-table 48, which has a resilient pad 49 on the under side thereof, and strikes on a resilient pad 50 on top of a spring supported switch-operating table 51, thus retarding or momentarily stopping the stroke or motion of the type-bar 29 before said type-bar is forced through the printing action by electric power. Striker-table 48 is secured on the end of shaft 52, and the spring supported switch-operating table 51 is slidably mounted on said shaft 52. A guide-shaft 53 is mounted in said switch-operating table 51 and extends through a hole in base-casting 36, a

spring 53 being mounted on guide shaft 53 to hold the switch-operating table 51 in the normal position shown in Figure 3, and in the dotted line position G of Figure 1.

Figure 3 shows the normal position of the spring supported switch-operating table 51, and on the rear of said table are formed two right angle projections 55 and 56 having holes formed therein. On projection 55 is secured an insulation member 57 by means of a screw or rivet 58, and a spring member 59 having a member 61 with a triangular point 62 thereon, is secured to the insulation member 57 by means of rivet 60. See Figures 3 and 6.

An adjustably supported electric switch unit, shown in Figures 3, 5 and 6, is adjustably supported on an L shaped bracket 63 secured to tie-bar support 33 by means of rivets 64, said switch unit comprising a base plate 65 of insulation material adjustably supported on L shaped bracket 63 by having elongated holes either in said base plate 65 or in the bracket 63 so that said switch may be moved up or down to determine the point in the path of travel of type-bar 29 that the electric power is to exert its force on projection 47 on said type-bar 29, and also the point at which the electric power will be released, or when point 62 will pass point 75 in Figure 6. Said switch base-plate 65 is secured to said bracket 63 by means of screws 66 and nuts thereon, and a binding-post screw 67 having a nut 68 thereon and also having a U shaped head 69 is mounted in the upper portion of insulation-plate 65. Another binding-post screw 70 having a nut 71 thereon is mounted in the lower portion of said insulation-plate 65, and the head of said binding-post screw 70 is formed into a contact point 73. A movable contact member 74, having a triangular shaped head 75, is pivotally supported between the arms of the U shaped head 69 on binding-post screw 67, and a spring member 76 mounted on binding-post screw 67 keeps the movable contact 74 separated from contact point 73, except when point 62 on member 61 is forced against point 75 on member 74 to close the electric circuit. When point 62 passes point 75 spring member 76 forces member 74 upward, thus breaking the electric circuit.

A means is provided whereby the movement of a type bar automatically actuates the switch, see Figures 1, 2, 3 and 6. When the type bar reaches the position B the formation 47 strikes the switch-actuating table 51, thus compressing spring 54 to the position shown in Figures 1 and 6, and also causing member 61 to force contact member 74 to compress spring 76 and cause contact member 74 to engage contact point 73, thus closing the electric circuit. At this point the switch-operating table 51 rests on a radial shoulder 79 formed on shaft 52, which shaft 52 is slidably engaged in a bushing 77 mounted in base-casting 36. A spring 78 is mounted around bushing 77 and interposed between said base-casting 36 and the radial formation 79 on shaft 52 to hold striker-head 48 in normal position, and on the lower end of shaft 52 is mounted a U shaped head with a small shaft 82 mounted in the arms thereof, a resilient cushion 81 being interposed between said U shaped head and the base-casting.

A power means is provided to pick up the action at this point by furnishing electric power in the form of quick-acting electric impulses to pick up the retarded movement of the type bar 29 and force it through the printing action and to further

actuate the electric switch and force point 62 to pass point 75, thus allowing spring 76 to disengage point 74 from point 73, thus breaking the electric circuit. The electric power also actuates the spacing mechanism and other mechanism through arm 100 having said mechanisms connected thereto.

This power means consists of a solenoid electric magnet 83 mounted between the arms 84 on bracket 85, said arms being secured thereto by screws 86, and bracket 85 being riveted to side-frame 1. In the upper end of magnet 83 is mounted a plug 87 and in the lower end of said magnet 83 is slidably mounted an armature plunger 88 having an L shaped brass bracket 89 secured thereto by means of a screw 90. A resilient bumper 92 is mounted around said armature plunger 88, and a stud 91 is mounted in said L shaped bracket 89, said stud engaging in a hole in an operating-arm 100 mounted on the end of an operating-shaft 93 pivotally supported in brackets 94 and 97 secured to tie-bar 23 by means of rivets 96 and 99 or by welding. Said operating-arm 100 is secured to said operating-shaft 93 by means of a hub 101 mounted in said operating arm and secured to the operating-shaft 93 by means of a pin 102. On the opposite end of said operating shaft 93 is also secured another operating-arm 105 having a hub 106 mounted therein and secured to shaft 93 by a pin 107, the free end of said operating-arm 105 extending between the arms 80 on the shaft 52 and engaging on shaft 82 so that when the electric circuit is closed, magnet 83 becomes energized and draws armature plunger 88 into the magnet, thus pulling up on lever 100 and causing arm 105 to pull shaft 52 downward to cause striker-table 48 to strike projection 47 on type-bar 29 with a quick impact, thus forcing type-bar 29 from position C to position D with sufficient force to jar the carbon loose for several copies, if desired. A rheostat 123 is wired in series with magnet 83 to minutely regulate the power or intensity of the impact upon the type bar, to produce the desired result, thus eliminating excess power that causes unnecessary noise. When the magnet causes striker-table 48 to strike projection 47 on type-bar 29 it also forces the switch-operating table 51 downward, thus forcing point 62 to pass point 75 on the switch and allowing spring 76 to break the electric circuit and deenergize magnet 83, whereupon the compressed springs 78 and 54 act to throw the type bar 29 back to normal position with great rapidity to increase typing speed.

It is common practice to use a long spacing key in front of the key board and a similar device is provided in this mechanism. The spacer-key 108 is mounted on the forward end of levers 109 and 110, in Figure 4, and said arms 109 and 110 are mounted on a pivoted shaft 111. A rearwardly extending arm 112 having a right angle formation 113 on the free end thereof, is also mounted on said shaft 111, and the free end of arm 112 engages one end of a pivoted arm 114 pivotally supported on bracket 97 by means of a rivet 115, the rearwardly extending end of arm 114 engaging on a hook member 116 secured to projection 56 on switch-operating table 51 by means of a rivet 117. Thus when spacing-key 108 is depressed it causes arm 114 to force switch-operating table 51 downward to cause the switch to close the electric circuit, thus causing the magnet to actuate operating arm 100. The spacing mechanism and other mechanism of the machine being connected to said operating arm 100 by means of

holes 103 and 104 are actuated independently of the type-bar action.

A means has been provided whereby the amount of power exerted upon the type-bar 29 may be controlled and regulated according to the number of carbon copies desired and this control means consists of a form of rheostat or resistor wired in series with the magnet 83 and comprising a base 119 of insulating material secured to one of the side-frames of the machine by means of screws 28, four screw studs 120 mounted on base 119 and having nuts 121 threaded thereon, a copper or brass bar 122 supported on the upper screw studs, a coil spring of microhm resistor wire 123 mounted on the lower screw studs 120, a cable 124 connecting bar 122 with magnet 83, a cable 125 connecting the microhm resistor wire 123 with the electric connecting-plug 126 mounted on side plate 1 by means of screws 127, a contact bracket 128 having an extension 220 to slidably engage the coil of resistor wire 123, and also having four right angle formations to engage bar 122 and form a guide thereon, a block insulating material 130 secured to bracket 128 by means of rivets 131, and an operating lever 132, mounted on insulating block 130 by means of a rivet 133.

The machine is operated by setting the rheostat 132 to the desired amount of power required, whether for 1 carbon copy or 6 carbons or stencil cutting, and then depressing key 16 causing key lever 9 to pull link 26 downward until key-lever 9 engages the key lever-stop 20, thus permitting the machine to continue the printing action independently of the key-lever, to give uniform type impressions. Before key-lever 9 has engaged the stop, it has caused lever 24 to push spring-stud 30 on pivoted type-bar 29 to a point past a center line between the type-bar pivot 39 and the pivot of the toggle-spring 31. This movement forces the arms of said toggle-spring toward each other, and when spring-stud 30 passes said line the toggle-spring 31 begins to expand, thus forcing type-bar 29 toward the platen and when it arrives at position B the projection 47 on type-bar 29 engages the switch-operating table 51 and depresses it from position G to position H, thus retarding the momentum of the type-bar and at the same time causing point 62 to engage point 75 thus causing the movable contact point 74 to engage contact point 73, closing the electric circuit and energizing magnet 83, and also causing the striker-table 48 to strike projection 47 on type-bar 29 with a short but sharp impact, thus forcing said type-bar through the printing action, and springs 78 and 54, and also forcing point 62 to pass point 75, thus allowing spring 76 to break the electric circuit and allowing springs 78 and 54 to throw the type-bar 29 back to normal position, and to restore the striker-table and switch operating table to normal position.

What I desire to secure by Letters Patent is:

1. A printing machine comprising a platen, a set of key levers, pivotally supported type bars carrying type heads, means connected to said type bars and operable by said key levers to swing the type bars toward the platen, a lost motion connection between each key lever and the associated type bar swinging means to permit each type bar to have a further pivotal movement independently of the key lever, an electric switch adapted to be engaged and actuated by each type bar as said bar nears the limit of its movement toward the platen in response to the movement of the said type bar swinging means, a

solenoid adapted to be energized through the closing of said switch, and means actuated by said energized solenoid to engage the type bar to complete its pivotal movement and force it to the platen to complete the printing stroke.

2. A printing machine comprising a set of key levers, pivotally supported type bars carrying rigid type heads and switch operating projections, a platen, means connected to said type bars and operable by said key levers to swing the type heads toward the platen, a lost motion connection between each key lever and the associated type bar swinging means to permit the type bars to have a further pivotal movement independently of their respective key levers, an electric switch adapted to be engaged and actuated by the projections on the type bars as said bars approach the limit of their movement toward the platen in response to the movement of the type bar swinging means, a solenoid adapted to be energized through the closing of said switch, and a hammer head actuated by said energized solenoid to strike the projections on the type bars to force the type bars to complete their printing strokes.

3. A printing machine comprising a set of key levers, pivotally supported type bars each carrying a rigid type head and a switch-operating projection, a platen, key lever actuated means connected to said type bars and adapted to swing the type bars and the type heads toward the platen, a toggle spring means connected to each type bar and adapted to be placed under tension by the motion of the type bar, a lost motion connection between each key lever and the associated key lever-actuated means to permit the type bars to have a further pivotal movement independently of their respective key levers, said toggle spring means being released through the movement of the type bars by the key lever-actuated means to move the type heads toward the platen, an electric switch adapted to be engaged and actuated by the projections on the type bars as said bars approach the limit of their movement toward the platen in response to the movement of the key lever actuated means and said spring means, a solenoid adapted to be energized through the closing of said switch, and means actuated by said energized solenoid to engage the projections on the type bars and complete their pivotal movements and force them to the platen to complete the printing strokes.

4. A printing machine comprising pivotally supported type bars carrying type heads, a platen, means for moving a selected type bar on its pivot to carry the type head toward the platen, yieldable means for retarding or momentarily stopping the selected type bar before it reaches the platen and adapted to be engaged by the type bar, an electric switch adapted to be operated by said yieldable means, a solenoid adapted to be energized through the closing of said switch, and means actuated by said energized solenoid to engage the selected type bar to complete its pivotal movement and force it to the platen to complete the printing stroke.

5. A printing machine comprising key levers, pivotally supported type bars carrying type heads, a platen, means actuated by said key levers for moving a selected type bar on its pivot to carry the type head toward the platen, a lost motion connection between each key lever and said means for moving a selected type bar to permit each type bar to have a further pivotal movement independently of said key lever, yieldable means

for retarding or momentarily stopping the selected type bar before it reaches the platen and adapted to be engaged by said type bar when moved toward the platen, an electric switch adapted to be operated by said yieldable means, a solenoid adapted to be energized through the closing of said switch, and means actuated by said energized solenoid to engage the selected type bar to complete its pivotal movement and to force it to the platen to complete the printing stroke.

6. A printing machine comprising key levers, pivotally supported type bars each carrying a rigid type head and a switch-operating projection, a platen, key lever actuated means connected to said type bars and adapted to swing the type bars and type heads toward the platen, a toggle spring means connected to each type bar and adapted to be placed under tension by the initial movement of the type bar, a lost motion connection between each key lever and the associated key lever actuated means to permit the type bars to have a further pivotal movement independently of their respective key levers. The tension on said toggle spring means being released through the further movement of the type bars by the key lever actuated means to move the type bars toward the platen, yielding means for retarding or momentarily stopping the type bars before they reach the platen and adapted to be engaged and actuated by said projections on the type bars, an electric switch adapted to be operated by said yieldable means, a solenoid adapted to be energized through the closing of said switch, and means actuated by said energized solenoid to engage the projections on the type bars and complete their pivotal movements and force the type heads to the platen to complete the printing strokes.

7. A printing machine comprising key levers, pivotally supported type bars carrying type heads, a platen, means actuated by said key levers for moving a selected type bar on its pivot to carry the type head toward the platen, a lost motion connection between each key lever and the means actuated thereby, a toggle spring means connected to each type bar and adapted to be placed under tension by the motion of the type bar and to be automatically released to continue the pivotal movement of the type bar toward the platen, said movement being permitted by said lost motion connection, yieldable means for retarding or momentarily stopping the selected type bar before it reaches the platen and adapted to be engaged by the type bar when moved by said toggle spring means, an electric switch adapted to be operated by said yieldable means, a solenoid adapted to be energized through the closing of said switch, and means actuated by said energized solenoid to engage the selected type bar to complete its pivotal movement and force the type head to the platen to complete the printing stroke.

8. A printing machine comprising a platen, pivotally supported type bars mounted on an arcuate pivot wire arranged in a horizontal plane, said bars being adapted to swing in converging planes to a common printing point on the platen, each of said type bars being formed with a forwardly extending crank arm, an arcuate spring-supporting rod rigidly mounted forward of the type bars, a series of toggle springs arranged in rearwardly converging planes above said arcuate bar one for each type bar, each of said springs being formed with an arm pivotally connected

to the said arcuate bar and another arm connected to the forwardly extending crank arm of a type bar, a set of key levers, and means actuated by each key lever and connected to said forwardly extending crank arm of each type bar to swing the type bar from its at rest non-printing position with its spring connection below said arcuate bar upwardly toward its printing position to carry the spring connection above the said arcuate bar, said movement of the type bar causing the arms of the spring to approach each other against the spring tension and then permitting the spring arms to expand and exert force to move the type head toward the platen, a lost motion connection being provided between each key lever and the means actuated thereby to permit the spring-actuated movement of the type bar independently of the key-lever.

9. A printing machine comprising a platen, pivotally supported type bars mounted on an arcuate pivot wire arranged in a horizontal plane, said bars being adapted to swing in converging planes to a common printing point on the platen, each of said type bars being formed with a forwardly extending crank arm and with a rearwardly extending switch operating projection, an arcuate spring-supporting rod rigidly supported forward of the type bars, a series of toggle springs arranged in rearwardly converging planes above said arcuate bar one for each type bar, each of said springs being formed with an arm pivotally connected to the said arcuate bar and another arm connected to the forwardly extending crank arm of a type bar, key actuated means connected to said forwardly extending crank arm of each type bar and adapted to swing the type bar from its at rest non-printing position with its spring connection below said arcuate bar upwardly toward its printing position to carry the spring connection above the said arcuate bar, said movement of the type bar causing the arms of the spring to approach each other against the spring tension and then permitting the spring arms to expand and exert force to move the type bar toward the platen, a yielding vertically movable switch-operating table adapted to be engaged and depressed by the said projections on the type bars as said bars approach printing position, a switch adapted to be closed by the depression of the said switch-operating table, a striker table mounted above the switch-operating table and adapted to extend over the said type bar projection when said projection is in engagement with the switch-operating table, a solenoid adapted to be energized through the closing of said switch, and means actuated by said energized solenoid to move the striker table downwardly to engage the said projection on the type bar and to move said projection and the switch-operating table downwardly to force the type head against the platen to complete the printing stroke.

10. A printing machine according to claim 9, characterized in that means operated by the downward movement of the striker table opens the solenoid circuit before the type bar reaches its final printing position.

11. A printing machine according to claim 9, characterized in that means operated by the downward movement of the striker table opens the solenoid circuit before the type bar reaches its final printing position, and spring means returns the switch-operating table and the striker table to normal inoperative positions when the solenoid circuit is broken.

12. A printing machine comprising a platen, pivotally supported type bars carrying type heads, means connected to each of said type bars and adapted to swing the connected type bar toward the platen, an electric switch adapted to be engaged and actuated by each type bar as said bar nears the limit of its movement toward the platen in response to the movement of the said type bar swinging means, a solenoid adapted to be energized through the closing of said switch, means actuated by said energized solenoid to engage the type bar to complete its pivotal movement and force it to the platen to complete the printing stroke, and means for varying the force of the stroke imparted to said type bar through said solenoid.

13. A printing machine according to claim 12, characterized in that adjustable resistance means is provided in the solenoid circuit for varying the force of the stroke imparted to the type bar through said solenoid.

14. A printing machine comprising pivotally supported type bars carrying type heads, a platen, an electric switch, means connected to each of said type bars and adapted to swing the connected type bar toward the platen, means constructed to cause the movement of each type bar to actuate the switch, means for retarding the motion of the type bar as the type head approaches the platen, electrical means adapted to be energized upon the actuation of said switch to pick up the type bar as it approaches the platen and swing it into contact with the platen to complete the printing stroke, and adjustable means for varying the power exerted on the type bar by said electrical means.

15. A printing machine comprising a platen, pivotally supported type bars carrying type heads, means connected to each of said type bars and adapted to swing the connected type bar toward the platen, an electric switch adapted to be engaged and actuated by each type bar as said bar nears the limit of its movement toward the platen in response to the movement of the said type bar swinging means, a solenoid adapted to be energized through the closing of said switch, means actuated by said energized solenoid to engage the type bar to complete its pivotal movement and force it to the platen to complete the printing stroke, and means operated by the energized solenoid to open the solenoid circuit before the type bar reaches its final printing position.

16. A printing machine according to claim 15, characterized in that means are provided to automatically return the said type bar engaging means to normal inoperative position when the solenoid circuit is broken.

17. A printing machine comprising pivotally supported type bars carrying rigid type heads, a platen, means connected to said type bars and adapted to swing the type bars toward the platen, a toggle spring means connected to each type bar and adapted to be placed under tension by the initial movement of the type bar, said toggle spring means being released through the continued swinging movement of the type bar to move the type bar toward the platen, and power means adapted to be set in operation by the type bars as said bars approach the platen, said power means including means adapted to engage the type bars and complete their pivotal movements and force them to the platen to complete the printing strokes.

18. A printing machine comprising pivotally

supported type bars each carrying a rigid type head and an operating projection, a switch, a platen, key actuated means connected to said type bars and adapted to swing the type bars toward the platen, a toggle spring means connected to each type bar and adapted to be placed under tension by the initial movement of the type bar, said toggle spring means being released through the continued movement of the type bar by the key-actuated means to move the type bar toward the platen, and power means adapted to be set in operation by the said projections on the type bars as said bars approach the platen, said power means including means adapted to engage the type bar projections and complete the pivotal movement of the type bars and force them to the platen to complete the printing strokes.

19. A printing machine comprising a platen, pivotally supported type bars mounted on an arcuate pivot wire arranged in a horizontal plane, said bars being adapted to swing in converging planes to a common printing point on the platen, each of said type bars being formed with a forwardly extending crank arm and with a rearwardly extending switch operating projection, key actuated means connected to said forwardly extending crank arm of each type bar and adapted to swing the type bar from its at rest non-printing position upwardly toward its printing position, a yielding switch-operating table adapted to be engaged by the said projections on the type bars as said bars approach printing position, a switch adapted to be closed by the said switch-operating table, a striker table adapted to extend over the said type bar projection when said projection is in engagement with the switch-operating table, a solenoid adapted to be energized through the closing of said switch, and means actuated by said energized solenoid to move the striker table to engage the said projection on the type bar and to move said projection and the switch-operating table to force the type head against the platen to complete the printing stroke.

20. A printing machine according to claim 19, characterized in that means are provided operated by the movement of the striker table to open the solenoid circuit before the type bar reaches its final printing position.

21. A printing machine according to claim 19, characterized in that means are provided operated by the movement of the striker table to open the solenoid circuit before the type bar reaches its final printing position, and spring means returns the switch-operating table and the striker table to normal inoperative position when the solenoid circuit is broken.

22. A printing machine comprising a platen, pivotally supported type bars mounted on an arcuate pivot wire arranged in a horizontal plane, said bars being adapted to swing in converging planes to a common printing point on the platen, each of said type bars being formed with a forwardly extending crank arm and with a rearwardly extending switch operating projection, key actuated means connected to said forwardly extending crank arm of each type bar and adapted to swing the type bar from its at rest non-printing position toward its printing position, a movable switch-operating table adapted to be engaged by the said projections on the type

bars as said bars approach printing position, a spring normally holding said switch operating table in position, a switch adapted to be closed by the said switch-operating table, a striker table adapted to extend over the said type bar projection when said projection is in engagement with the switch-operating table, a spring normally holding the striker table, a solenoid adapted to be energized through the closing of said switch, and means actuated by said energized solenoid to move the striker table to engage the said projection on the type bar and to move said projection and the switch-operating table to force the type head against the platen to complete the printing stroke.

23. A printing machine comprising a platen, pivotally supported type bars mounted on an arcuate pivot wire arranged in a horizontal plane, said bars being adapted to swing in converging planes to a common printing point on the platen, each of said type bars being formed with a forwardly extending crank arm and with a rearwardly extending operating projection, key actuated means connected to said forwardly extending crank arm of each type bar and adapted to swing the type bar from its at rest non-printing position upwardly toward its printing position, a yielding vertically movable operating table, adapted to be engaged and depressed by the said projections on the type bars as said bars approach printing position, a power means adapted to be set in operation by the depression of the said operating table, a striker table mounted above the operating table and adapted to extend over the said type bar projection when said projection is in engagement with the operating table, and means actuated by said power means to move the striker table downwardly to engage the said projection on the type bar and to move said projection and the operating table downwardly to force the type head against the platen to complete the printing stroke.

24. A printing machine according to claim 23, characterized in that there is provided means operated by the downward movement of the striker table to render the power means inoperative before the type bar reaches its final printing position.

25. A printing machine comprising key levers, pivotally supported type bars each carrying a rigid type head and a switch operating projection, a platen, means actuated by said key levers and connected to said type bar to carry the type heads in a pivotal motion toward the platen, a lost motion connection between each key lever and the means actuated thereby to permit the type bars to have a further pivotal movement independent of the key lever, a spring actuated retarding mechanism adapted to be engaged and actuated by the projections on the type bars, an adjustable electric switch actuated by said retarding mechanism, a solenoid magnet adapted to be energized through the closing of said switch, a hammer mechanism actuated by said energized solenoid magnet adapted to engage on the projections on the type bar to complete their pivotal movements and force them to the platen to complete the printing strokes and a spring actuated mechanism adapted to speed the return of the type bars to normal position.

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