March 25, 1952 LIN YUTANG 2,590,594

SPRING POWERED TYPE BAR ACTUATING MECHANISM FOR TYPEWRITERS

Filed Aug. 22, 1950 2 SHEETS--SHEET 1

FIG.1.

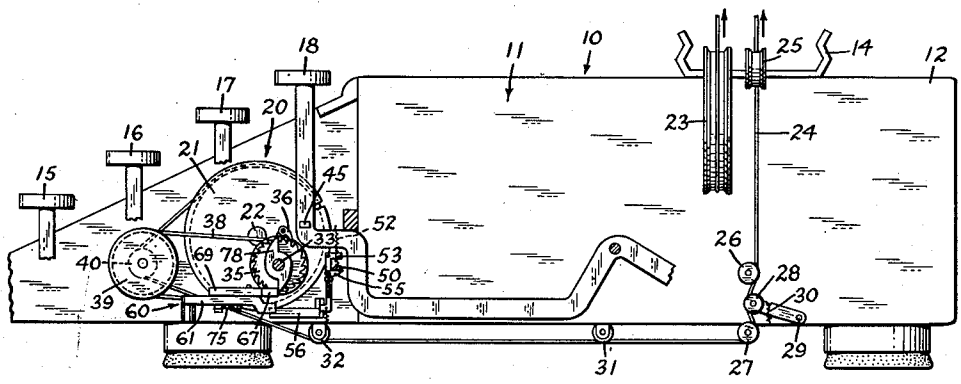

FIG.2.

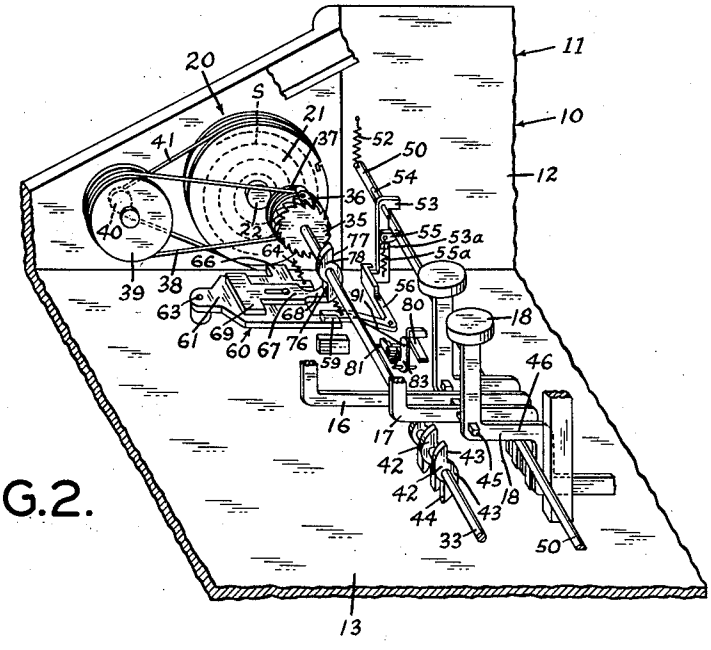

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FIG.3.

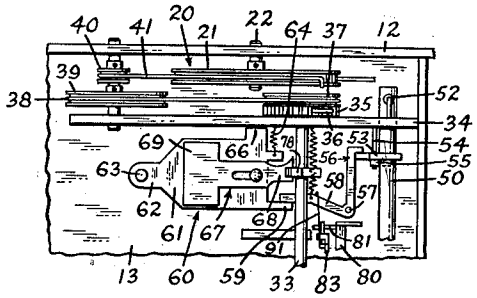


FIG.5.

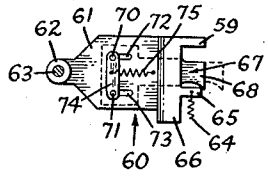


FIG.4.

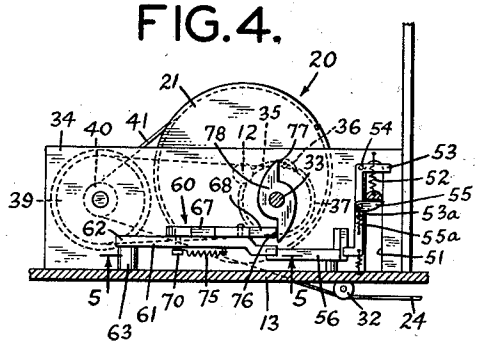


FIG.6.

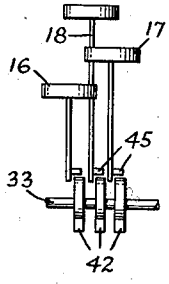


FIG.7.

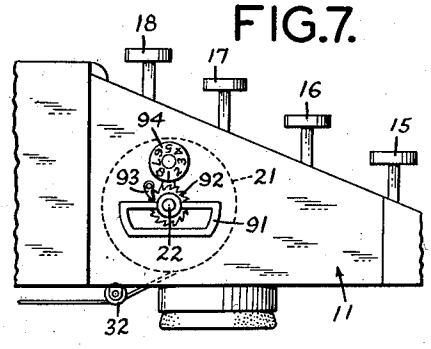
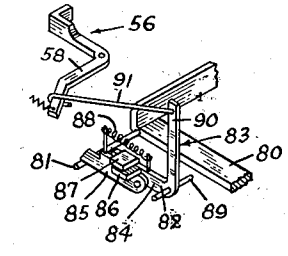


FIG.8.



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Patented Mar. 25, 1952

2,590,594

UNITED STATES PATENT OFFICE

2,590,594

SPRING POWERED TYPE BAR ACTUATING MECHANISM FOR TYPEWRITERS

Lin Yutang, Zurich, Switzerland

Application August 22, 1950, Serial No. 180,719

8 Claims. (Cl. 197—17)

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This invention relates to improvements in typewriters and it relates to an improved form of typewriter by means of which uniformity of touch and neat uniform copy can be obtained even by an unskilled typist.

In typing, many years of practice are required to train the fingers so that they have the proper touch to provide uniformity in the copy. Inasmuch as this ability or skill can be acquired only after long practice, the so-called electric typewriter was devised to give greater flexibility of operation and to control the pressure or impact of the type bars. Such electric typewriters are very successful, but have the disadvantages of being expensive, cumbersome and difficult to service. Moreover, they cannot be used in areas where electric power is unavailable.

The present invention relates to a typewriter by means of which a uniform touch and uniform type bar pressure or impact are obtained mechanically, and without the need for any source of power other than that supplied by the operator in the normal operation of the typewriter.

More particularly, the typewriter according to the present invention includes a spring motor which is wound by the action of the operator in shifting the paper carriage during line spacing. The spring motor is connected to and drives an actuating mechanism which is released by partially depressing any of the type-bar actuating keys and acts to depress completely the partially depressed key or the key lever and cause the type bar to strike the paper. Inasmuch as the type bar is actuated to a large degree by the spring motor it tends to make the impact of the type bars uniform against the paper thereby smoothing out any uneveness of touch that the skilled or unskilled typist might have.

The motor may be provided with an auxiliary winding key and release by means of which the spring may be wound tighter or relieved of tension when more or fewer carbon copies are to be made.

The mechanism may also be controlled by the spacer key of the typewriter to release the spring motor step by step as the spacer key is operated to prevent overwinding the motor when the carriage is traversed for line spacing.

The mechanism embodying the present invention is sufficiently compact and simple that it may be used readily in portable typewriters and, of course, in standard typewriters without any appreciable increase in their over-all size.

For a better understanding of the present invention, reference may be had to the accompanying drawings in which

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Fig. 1 is a view in section and partly broken away of a portion of a typewriter including mechanism embodying the present invention;

Fig. 2 is a perspective view of a portion of the typewriter disclosing the touch control mechanism applied thereto;

Fig. 3 is a plan view of a portion of the touch control mechanism;

Fig. 4 is a view in elevation of the mechanism disclosed in Fig. 3;

Fig. 5 is a view in section taken on line 5—5 of Fig. 4 with parts omitted;

Fig. 6 is a view in front elevation illustrating the relation between the actuating arms and several of the keys and key levers of the typewriter;

Fig. 7 is a view in side elevation of a portion of the typewriter illustrating a manual winding key and a dial for indicating the tension of the spring, and

Fig. 8 is a perspective view of a portion of the trigger mechanism for releasing the actuating arms of the touch control by means of the spacer bar.

The invention will be described with reference to its use in a conventional compact typewriter of the portable type, only so much of the typewriter being shown as is necessary to illustrate the location and the co-action of the touch control mechanism with the actuating keys and key levers.

Referring now to Figs. 1 and 2, the typewriter 10, illustrated diagrammatically, includes a frame 11 including a side frame element 12 at each end and a base plate 13, which support the various elements of the typewriter. As shown in Fig. 1, the typewriter may be provided with a carriage guide or rail 14 on which is mounted the paper carriage and platen roller, not shown, which cooperate with the usual type bars, also not shown. The typewriter may include the usual four banks of keys 15, 16, 17 and 18, as well as the spacing bar and other conventional elements.

The touch control and drive mechanism, as shown in Figs. 1, 2, 3 and 4, includes a spring motor 20 consisting of a drum 21 which houses a spiral coil spring S, one end of the spring being connected to the drum and the other end to a shaft 22 which is supported by and rotatably mounted in the side 12 of the typewriter.

As shown in Fig. 1, the carriage is normally urged in one direction during typing and spacing operations by means of the usual spring motor 23. In accordance with the present invention, the carriage is also connected by means of a cable 24 to the exterior of the drum 21 about

which the cable is wound. The cable 24 passes over a guide pulley 25, a pair of idler pulleys 26 and 27 and the tensioning lever 28 which is mounted on a pivot pin 29 on the side frame 12. The lever 28 is normally urged inwardly against the cable to take up slack in the cable by means of a spring 30 connected at one end to lever 28 and at the other end to the base 13 of the typewriter. The cable 24 also passes over the idler pulleys 31 and 32 toward the front of the machine, and then around the drum 21. The pulleys 31 and 32 are rotatably mounted on the base of the typewriter. When the carriage is then traversed for line spacing, the cable unwinds from and rotates the drum 21 in a counterclockwise direction thereby winding up the spring S.

The energy stored in the spring by traversing movement of the carriage is used to aid in actuating the type bars of the machine. The mechanism for this purpose will now be described.

The spring motor 20 serves to drive a shaft 33 which is rotatably mounted at its opposite ends in a vertical partition 34 (Figs. 3 and 4) spaced inwardly from the side 12 as shown in Fig. 3, and in the opposite side of the typewriter. The shaft 33 is positioned below the knees or elbows of the several keys identified as 15, 16, 17 and 18 so that these keys can be fully depressed without interference from the shaft. The shaft 33 carries at one end a ratchet 35 which cooperates with a pawl 36 mounted upon a pulley 37 which is rotatably supported on the shaft 33. When the pulley 37 is rotated clockwise as shown in Figs. 1 and 2, the shaft 33 is driven in the same direction. However, the pulley 37 can rotate counterclockwise without rotation of the shaft 33 when the spring S is being rewound.

The pulley 37 is driven by means of a transmission including a belt 38 connecting the pulley 37 to a larger pulley 39, a small pulley 40 fixed to the pulley 39 and a belt 41 connecting the drum 21 to the small pulley 40. The ratio between the drum and shaft 33 is about 10 to 1 so that the rotation of the shaft through a half revolution will correspond to the displacement of the carriage in typing one letter or a space between letters. In this way, the spring will be rewound to the same tension after each line of type has been typed. The circumference of the drum 21 is so related to the traversing movement of the paper carriage that when the motor 20 is wound up it will store enough energy to type at least a complete line across the paper.

The shaft 33 carries a plurality of oppositely extending arms 42, each of which has oppositely directed flat portions 43 and 44 extending substantially radially of the shaft. One such arm 42 is provided on the shaft for each type bar key on the typewriter. The arms 42 are of such thickness and spacing that they can pass between the stems or levers of the keys 15, 16, 17 and 18 when the keys are depressed. Each of the keys actuates a type bar and the touch control mechanism cooperates with the several keys in the same manner so that the action of only one of the keys will be described hereinafter, it being understood that all of the other keys are actuated in the same manner.

The key 18 as viewed in Figs. 1 and 2 is provided with a lateral projection 45 which extends into the path of an arm 42 when the key has been depressed a short distance, for example, a quarter of an inch. If the shaft 33 is rotated in a clockwise direction, as viewed in Figs. 1 and 2, when the projection comes into the path of the arm 42, the arm will strike the projection and will force the key down due to the action of the spring motor 20 to type an impression on the paper on the carriage.

The rotation of the shaft 33 is controlled by a trigger mechanism, now to be described, which is actuated by depressing any of the keys. As shown in Figs. 1, 2, 3 and 4, a bar 50 extends transversely of the typewriter below the knee 46 of the key 18. The bar 50 is guided at one end in a slot 51 in the partition 34 and at its opposite end in similar slot or guide in the opposite side frame of the typewriter. The bar is normally urged upwardly by means of springs 52 at its opposite ends. The bar 50 is pressed down when any of the keys is depressed. The bar 50 cooperates with a bell crank lever 53, Figs. 1, 2 and 4, mounted for pivoting movement on a pin 54 extending from the partition 34. The bell crank lever carries a small pivoted pawl member 55 which can rock up into a substantially vertical position against the tension of the spring 55*a* but cannot rock down beyond the position in which its upper surface is substantially horizontal. The downward movement of the pawl is limited by means of a fixed block 53*a* on the bell crank lever 53 disposed below the pawl. When the bar 50 is moved downwardly, it strikes the upper surface of the pawl 55 and rocks the bell crank 53 clockwise. Upon continued downward movement of the bar 50, it slides off and passes by the pawl 55 so that the bell crank 53 can swing back to a substantially vertical position. As the bar 50 moves from its position below the pawl 55, it will rock the pawl 55 upwardly about its pivot and pass by it without rocking the bell crank 53.

The lower end of the bell crank 53 engages one end of a horizontally positioned bell crank 56 which is mounted on a vertical pivot 57 extending upwardly from the base 13 of the typewriter.

The other arm 58 of the bell crank 56, as viewed in Fig. 3, engages a lug 59 extending outwardly from a release and stop mechanism 60 by means of which a rotation of the shaft 33 is controlled. As best shown in Figs. 2 and 5, the mechanism 60 includes a plate 61 having an extension 62 receiving a pivot pin 63 extending upwardly from the bottom plate 13. The plate 60 thus is capable of moving in either direction about the pivot pin 63. The lug 59 projects from the righthand edge of the plate 61 as shown in Fig. 3. The plate is normally urged in a counterclockwise direction by means of a spring 64 connected at one end to the partition 34 and at the other end to a lug 65 extending from the plate 61. A laterally extending abutment 66 is also provided for limiting the counterclockwise movement of the plate by engagement with the partition 34.

Mounted on the plate 61 is a stop and release member 67 which includes a forwardly extending end portion 68 joined at its rear end to a rectangular plate 69 overlying the plate 61. As shown in Fig. 5, the rectangular plate 69 carries a pair of pins 70 and 71 which extend through the slots 72 and 73 in the base plate and are connected by means of a narrow bridge plate 74 to retain the member 67 on the plate 61 while permitting longitudinal sliding movement of the stop member 67. The stop member 67 is normally urged to the right as viewed in Figs. 3 and 5 by means of a spring 75 connected to the bridge plate 74 and the plate 61. The spring 75 acts to absorb shock, as will be described later herein.

The end 68 of the stop member 67 cooperates with the radially extending faces 76 and 77 of a member 78 like the arms 42 described above. That is, the end 68 of the tooth engages one of the flat faces, for example the face 76, to prevent rotation of the shaft 33. However, when one of the keys, for example key 18 is depressed, its knee 46 forces the bar 50 down, thereby rocking the bell crank 53 clockwise and the bell crank 56 counterclockwise to displace the end 68 of this stop member 67 out of engagement with the face 76 of the member 78. This permits the shaft 33 to rotate with the result that an arm 42 thereon strikes the projection 45 on the key 18 and forces that key down with resulting movement of the type bar. As the key 18 moves down it carries the bar 50 with it. Shortly after the bar 50 releases the member 78, the bar 50 passes by the pawl 55 on the lever 53. As a result, the stop 67 is released and snapped by the spring 64 into a position to intercept and engage the face 77 on the arm 78 thereby limiting the rotation of the shaft to 180°. Inasmuch as the face 77 may strike the stop member 67 with considerable force, the latter may be displaced against the action of the spring 75 which acts to take up the shock and dissipate it.

The length of the arms 42 is such that they will slide off these corresponding key projections, such as the projection 45, at about the time that the type bar strikes the paper. The key 18, or any other depressed key, is released when the arm 42 slides by the projection 45 and can move up to its initial position.

Inasmuch as the typing operation is immediately followed by spacing of the carriage, the spring motor 20 moves one step in advance of spacing during each typing operation. For that reason, the tensioning lever 28 is provided to take up and release the slack in the cable 24 during the typing operation.

Slack also would accumulate during a spacing operation with the spacing bar. To prevent this action, another trigger mechanism is provided which is actuated by movement of the crossbar 80 inside the typewriter which is connected to and supports the spacing bar of the typewriter. A fragment of the crossbar 80 is shown in Figs. 2 and 8. The crossbar 80 is provided with a rearwardly extending lever 81 which engages one arm 82 of a bell crank 83. The arm 82 of the bell crank is made up of an inner rigid portion 84 and a pivoted portion 85 which can tip down relative to the arm portion 84 but it is prevented from swinging up beyond a position in alignment with it by means of a pair of abutting flanges 86 and 87. The arm portions 84 and 85 are further urged into alignment by means of a spring 88 connected between them. With the above described arrangement, the lever 81 can move up and strike the end of the arm portion 85 thereby rocking the bell crank about its pivot 89. The other arm 90 of the bell crank is connected by means of a lost motion link 91 to the arm 58 of the bell crank 56 so that upward movement of the lever 81 will shift the stop member 67 out of the path of the arm 78 thereby releasing the shaft 33 for a 180° rotation each time the spacer bar is depressed. The lever 81 passes by the end of the arm portion 85, just after the stop member 67 releases the arm 78 on the shaft 33. The stop member 67 then swings back to prevent more than 180° rotation of the shaft 33. Inasmuch as none of the keys is depressed during spacing, the arms 42 cannot engage the projections 45. Actuation of the

motor 20 during spacing thereby keeps the cable taut and also assures the proper rewinding of the spring when the carriage is traversed for line spacing.

Inasmuch as it may be desirable to vary the tension of the spring motor to produce different numbers of carbon copies or to increase or decrease the tension of the spring S, a winding key 91 is mounted on the end of the spring motor shaft 22 and is accessible from the exterior of the typewriter. This winding key may be provided with a ratchet 92 cooperating with a pawl 93 mounted on the casing so that it can be turned to wind the spring. The pawl can be released to reduce the tension on the spring. The key can also be connected to an indicating dial 94 which may be suitably calibrated to indicate tension or the number of carbon copies to be made.

From the preceding description of a typical drive mechanism for a typewriter embodying the present invention, it will be apparent that substantially uniform impact of the type bars with paper will be obtained due to the action of the spring motor in forcing the keys down to the full length of their stroke and this added power will overcome any tendency of the unskilled typist to vary the typing pressure and impact and thereby prevent the production of nonuniform copy.

While the form of the invention described above is the preferred embodiment, it will be understood that the mechanism is susceptible to considerable modification. Thus, the trigger mechanism may be modified substantially by using another type of stop and release mechanism without departing from the invention. Also, the shape and size and location of the parts may be substantially modified to accommodate the mechanism to different makes or kinds of typewriters. Therefore, the form of the invention described above should be considered as illustrative and not as limiting the scope of the following claims.

I claim:

1. In a typewriter having manually depressible key elements to actuate type bars; the combination of a projection on each key element, a spring motor, a rotary member driven by said motor and having outwardly extending arms corresponding to each projection and adjacent to each key element, each arm being rotatable through a path intersecting the path traversed by a corresponding projection, during depression of the key element bearing the projection, to engage the projection and fully depress the key element, the projection normally being outside the paths of said arms when the key elements are not depressed, a releasable latch to retain said rotary member against rotation, and means responsive to depression of any of said key elements sufficiently to bring its projection into the path of a corresponding arm to release said latch and allow said rotary member to rotate and fully depress the key element.

2. In a typewriter having manually depressible key elements to actuate type bars and a traversable paper carriage; the combination of a projection on each key element, a spring motor, a rotary member driven by said motor and having outwardly extending arms corresponding to each projection and adjacent to each key element, each arm being rotatable through a path intersecting the path traversed by a corresponding projection, during depression of the key element bearing the projection, to engage the projection and fully depress the key element, the projec-

tions normally being outside the paths of said arms when the key elements are not depressed, a releasable latch to retain said rotary member against reaction, means responsive to depression of any of said key elements sufficiently to bring its projection into the path of a corresponding arm to release said latch and allow said rotary member to rotate and fully depress the key element, and means connecting said paper carriage to said spring motor to wind the latter upon traversing movement of said carriage in one direction.

3. In a typewriter having manually depressible key levers to actuate type bars, and a paper carriage traversable in one direction for spacing and returnable in the other direction; the combination of a spring motor, means connecting said motor to said carriage to wind said motor by manual return of said carriage, a rotary shaft driven by said motor and having a plurality of arms extending outwardly therefrom adjacent to said key levers, projections on said key levers normally spaced from the paths of rotation of said arms, and movable into the paths of said arms for engagement therewith by partially depressing said key levers, a releasable stop member normally engaging one of said arms to retain said shaft against rotation, a bar adjacent to said key levers and moved by depressing said key levers, and means actuated by movement of said bar to release said stop member momentarily and allow said shaft to rotate through at least a fraction of a revolution thereby to engage an arm with a projection on any key lever depressed sufficiently to bring the projection into the path of said arm.

4. The typewriter set forth in claim 3 including a manually depressible spacer bar to release said paper carriage for spacing in said one direction, and a member actuated by depressing said spacer bar to momentarily release said stop member to unwind said spring motor in proportion to the spacing movement of said carriage.

5. The typewriter set forth in claim 3 including separate manually actuated means for winding said motor to vary the tension of its spring.

6. The typewriter set forth in claim 3 in which said stop member comprises a pivotally movable plate, a stop element engageable with said arm and slidably mounted on said plate, resilient shock-absorbing means normally urging said stop element toward said arm, and means on said plate engageable with the means actuated by movement of said bar for pivotally moving said plate to disengage said stop element from said arm.

7. In a typewriter having manually depressible key levers to actuate type bars and a paper carriage traversable in one direction for spacing and returnable in the other direction; the combination of a spring motor including a coiled spring and a rotatably mounted drum connected to one end of said spring, means connecting said drum to said carriage to wind said spring as said carriage is returned in said other direction, a rotatable shaft adjacent to said key levers, one-way driving means connecting said drum to said shaft to rotate the latter as said spring unwinds, a plurality of arms extending from said shaft, each arm being movable past one of said key levers, a projection on each key lever movable into the path of a corresponding arm when the key lever is partially depressed, a pivotally mounted stop member adjacent to and normally disposed in the path of one arm on said shaft, a bar adjacent to said key levers and movable thereby when any of the key levers is depressed sufficiently to move the projection thereon into the path of a corresponding arm, and a trigger mechanism interposed between said bar and said stop member to move the latter out of the path of said one arm to release said shaft, and quickly return the stop member into the path of said one arm to arrest rotation of said shaft.

8. The typewriter set forth in claim 7 comprising a spacer bar to cause spacing movement of said carriage, and a second trigger mechanism connecting said spacer bar to said stop member to actuate the latter to release said shaft for rotation and quickly arrest its rotation.

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