Jan. 16, 1934. H. L. PITMAN 1,943,548

COMBINED TYPEWRITING AND COMPUTING MACHINE

Original Filed June 2, 1926 2 Sheets-Sheet 1

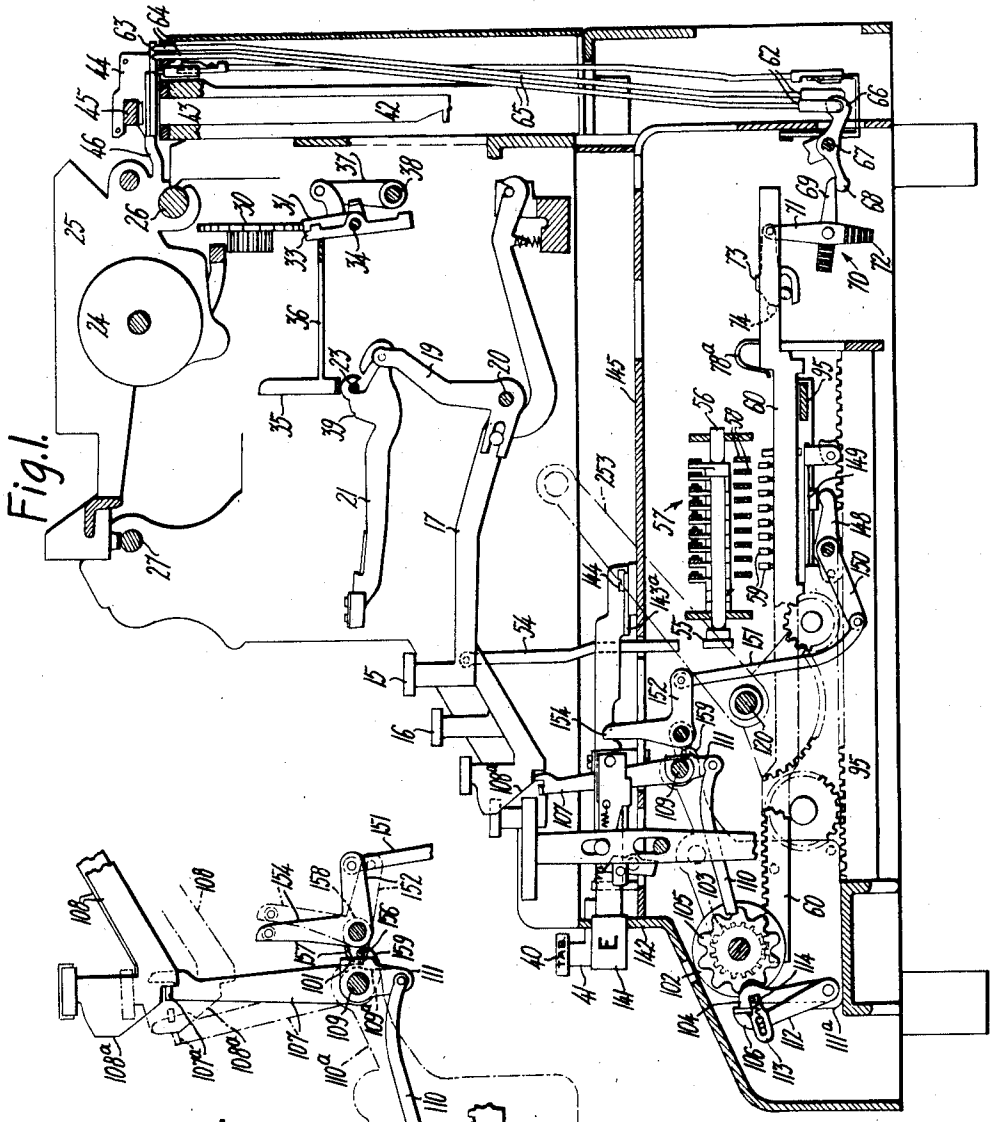


Fig. 1.

Fig. 2.

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Fig. 3.

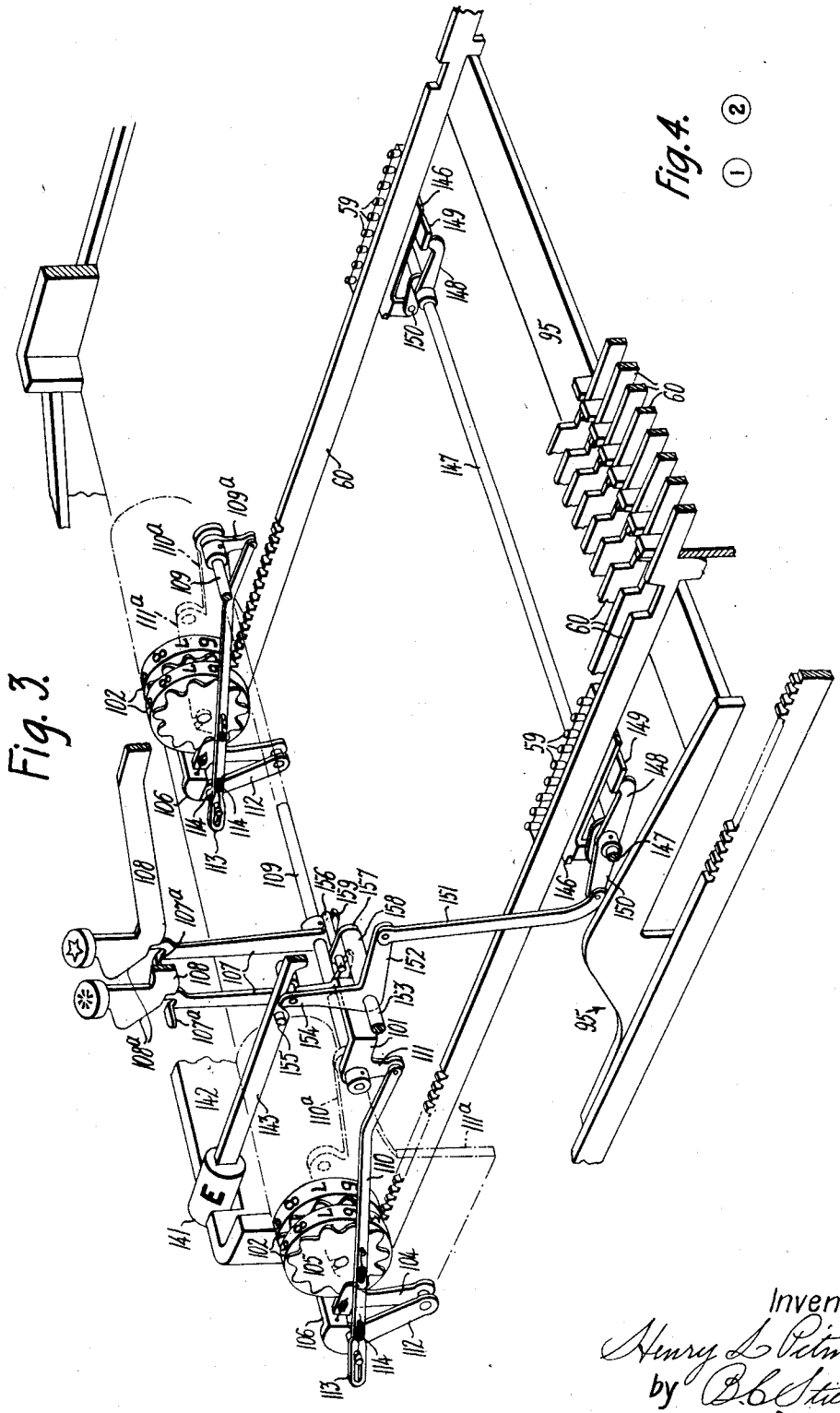


Fig. 4.

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UNITED STATES PATENT OFFICE

1,943,548

COMBINED TYPEWRITING AND COMPUTING MACHINE

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Original application June 2, 1926, Serial No. 113,133. Divided and this application August 14, 1931. Serial No. 556,968

4 Claims. (Cl. 235—60)

This invention relates to combined typewriting and computing machines of the Underwood-Hanson type, and particularly to improvements therein whereby the usual functions of the machine are facilitated and accomplished with greater convenience to the operator, and whereby the costs of manufacturing and maintaining said machines are substantially reduced.

In said type of machines the numeral-keys of the typewriter, when operated while the carriage is in a computing zone, set corresponding index-pins in rack-bars of a computing mechanism that is below the typewriter. These rack-bars subsequently run the digits indexed therein into computing wheels. To enable any numeral-key to set an index-pin in any rack-bar, a so-called pin-setting frame is interposed between members depending from the numeral-key-levers and the index-pins on the rack-bars. The pin-setting frame includes pin-setting bars, one for each numeral-key, arranged transversely of the rack-bars and over the index-pins therein. Each pin-setting bar is depressible by an operation of a corresponding numeral-key, and, when projected, is normally in advance of the corresponding transverse row of index-pins. To enable the pin-setting bar to set an index-pin, the rack-bar in which the pin is to be set must be slightly advanced, so that the index-pins therein are directly under the pin-setting bars. There is usually a plurality of said rack-bars, and they are advanced one after the other in denominational order as the typewriter-carriage passes in letter-feeding steps through a computing zone.

A feature of the present invention is to provide improved means whereby the usual clear sign character may be printed when all the dial-wheels of a register stand at zero. Said improved means enable the printing of said character to be done by regular finger operation of a key-lever instead of said key-lever being actuated by means of a spring and other devices and restored during a machine cycle of the computing mechanism, as shown in the patent to R. F. Hoyt, No. 1,256,309, dated February 12, 1918.

In the present invention two keys and two key-levers of the regular keyboard are used to print asterisks or stars of different designs, one for each register. An interponent under each of said two key-levers is in position to thwart the operation of said key-levers, if the corresponding registers are not clear. If a register is clear, the interponent is caused to be withdrawn by means of a link which connects it to the usual bail, shown in said patent to Hoyt. Said bail is spring-pressed against the usual row of detents which locate the dial-wheels in their digit positions by means of the usual detent-notches in the dial-wheels. The detent-notch corresponding to the zero position of a dial-wheel is more indented than the other notches; consequently when all the dials are at zero, the bail, bearing against the detents, has assumed a position which causes the aforesaid interponent to be withdrawn.

A feature related to the star key-levers is the simple means whereby said levers when operated also cause the restoration of any pins that may have been idly set in the computing mechanism rack-bars. It will be understood that such idly set pins, if not restored, would cause the corresponding register to indicate a result not in accord with the figures regularly entered therein. Thus the printing of a star not only indicates that the register is cleared, but it also indicates that no pins are set when a star is printed, and the means whereby the restoration of any idly set pins is thus accomplished include a simple cam that may be on the end of and part of each star key-lever. Said cam engages the end of the interponent which is in the form of an arm of a bell-crank lever and rotates it so that the other arm of said bell-crank lever engages and actuates the pin-restoring connections related to the elimination key.

Said elimination key includes a bar movable endwise and connected to the usual pin-restoring means by means consisting of a bell-crank, one arm of which is engaged and moved by the endwise movement of the elimination key-bar. The other end of the bell-crank by means of a simple link is connected to an arm by which the usual pin-restoring platform-shaft, shown in said patent to Hoyt, may be operated. The elimination key on its return stroke operates the usual starting key to initiate a machine cycle of the computing mechanism to cause the restoration to normal of all parts of the computing setting mechanism. To operate the starting key the elimination key-bar is provided with a bypass pawl that is ineffective to actuate said starting key on the forward stroke of the elimination key.

This application is a division of my application, Serial No. 113,133, filed June 2, 1926 (now Patent No. 1,827,298, dated October 13, 1931).

Other features and advantages will hereinafter appear.

In the accompanying drawings,

Figure 1 is a cross-sectional side elevation of an Underwood-Hanson combined typewriting

and computing machine, showing features of the invention.

Figure 2 is a fragmentary side view showing the star-key-levers and the parts that control the operation of said levers.

Figure 3 is a perspective view of the computing mechanism showing features of the invention.

Figure 4 shows an alternative design of characters to be printed by what would otherwise be the star-key-levers.

In the Underwood-Hanson bookkeeping machine numeral-keys 15 and alphabet-keys 16 swing key-levers 17 to cause bell-cranks 19 to swing about a fulcrum 20 and operate type-bars 21. Said type-bars when operated swing upwardly and forwardly about a fulcrum 23 to print against a platen 24. Said platen is revolubly mounted in a carriage 25 which is movable on rails 26 and 27 in a letter-feeding and reverse direction.

The carriage is pulled in said letter-feeding direction by a spring-motor, not shown. The letter-feeding steps of the carriage are controlled by an escapement-mechanism that includes an escapement-wheel 30 controlled by a loose dog 31 mounted on a dog-rocker 32 which also embodies a fixed dog 33. Said dog-rocker is pivoted at 34 for a rocking motion imparted to it by the universal bar 35. A rearward extension 36 of said universal bar is supported and guided by a U-shaped frame 37 pivoted at 38. The universal bar 35 is actuated in the usual manner by a heel 39 of any operated type-bar. The usual Underwood denominational tabulating mechanism includes a plurality of tabulating keys 40, which are mounted on key-levers 41 partly shown in Figure 1.

The rearward extension, not shown, of said key-levers 41 when operated elevate the usual denominational stops 42 to cause the upper ends 43 thereof to be projected into the path of the usual tabulating counter-stops 44. Said counter-stops are settable in the usual notched bar 45 supported between brackets 46 projecting from the typewriter-carriage 25.

Each numeral-key-lever has depending therefrom the usual stem 54. Said stem when a numeral-key is operated is thrust downwardly to engage an arm 55, and thereby rotate a rock-shaft 56 of a pin-setting frame generally indicated at 57. There is a rock-shaft 56 for every significant numeral key-lever, and operation of said rock-shaft causes a corresponding pin-setting bar 58 to be depressed. The pin-setting bars, of which there is one for every significant numeral-key-lever, overlie a bank of index-pins 59, nine of which are in each rack-bar 60. The pin-setting bars 58 are normally slightly forward of the corresponding transverse rows of index-pins. To enable an index-pin to be set in any rack-bar, said rack-bar must be advanced slightly, so that the pins therein lie directly under the pin-setting bars. The rack-bars are thus advanced or selected one after the other in denominational order as the typewriter-carriage moves through a computing zone.

To accomplish this denominational selection of the rack-bars, a tappet 63 forming part of stop 44 engages the upper ends 64 of thrust-rods 65 as the typewriter-carriage passes through said computing zone, and as the tappet overrides said upper ends 64, one or two thrust-rods, each corresponding to a different register, are caused to be depressed at the end of each letter-feeding step of the carriage through a computing zone.

The thrust-rods when depressed rotate levers 66, connected to the lower ends of said thrust-rods. Said lower ends may be in the form of lugs 62 having screw-holes into which the end thrust-rods are threaded, said screw-holes enabling adjustment of the effective lengths of the thrust-rods. The levers 66 are mounted on a common fulcrum-shaft 67, and have arms 68 which engage arms 69 of transposing levers 70. Said transposing levers are for the purpose of inverting the order of operation between the thrust-rods and the corresponding rack-bars. Said inversion is necessary because the typewriter-carriage moving in letter-feeding steps actuates the thrust-rods from right to left, but the corresponding rack-bars must be denominationally selected and advanced in an order beginning from left to right.

An arm 69 of each of said transposing levers 70 is substantially in the plane toward which the corresponding thrust-rod is normally directed, and an arm 71 of the same lever is in a plane adjacent to the corresponding rack-bar. Arms 69 and 71 of each pair are connected by a U-shaped yoke 72. The yokes of the different levers vary in depth, and are disposed in groups, the yokes of each group nesting one within the other. Rotation of one of the transposing levers 70 is effected when a thrust-rod 65 is depressed. This rotation causes a thrust-bar 73, connected to the arm 71, to be thrust forward and thereby advance a rack-bar by means of a projecting pin 74 fastened in the side of said rack-bar. A rack-bar is held in its denominationally advanced position until, by operation of any numeral-key, the carriage escapes and advances a letter-feeding step and thereby causes the advance of the next rack-bar, the previously advanced bar being thereupon retracted by a spring 78a.

When index-pins have been set in the rack-bars, by operation of the numeral-keys, the lower ends of the set index-pins project below the rack-bars and lie in the path of a general operator 95 which is now caused to move forward and back. The forward movement of said general operator is transmitted to said rack-bars which thereby move through a number of digit-spaces depending upon the pins that were set. As said rack-bars move forward they rotate the dial-wheels 102 by means of pinions 103, said pinions having the usual ratchet connections, not shown, to the dial-wheels 102 whereby said wheels are rotated only during the forward movement of the rack-bars. The number of digit-spaces that each dial-wheel is rotated depends upon the extent of the forward movement of the corresponding rack-bar. At each digit-space the dial-wheel is detented, by means of a spring-pressed detent-lever 104, co-operating with detent-notches 105 formed on the side of each dial-wheel. The detent-notch corresponding to the zero position of each dial-wheel is more indented than the other notches, thereby causing a corresponding displacement of the detent-lever 104 when the dial-wheel is at zero. When all of the dial-wheels of a register stand at zero, said corresponding displacement in the position of all the detent-levers 104 causes a bail 106, which is spring-pressed against said detent-levers, to assume a corresponding position. Thus, the bail 106 has one position when all the dial-wheels stand at zero, and another position when one or more dial-wheels are rotated past zero. The displacement from one position to another of the bail 106 is used to actuate an

interponent 107, and causes said interponent to be in either one of two positions. In the one position, as shown in Figure 1, said interponent clears the end of a corresponding key-lever 108 so that said key-lever is free to be operated. This condition occurs when all the dial-wheels stand at zero. Should any dial-wheel of a register be at a position other than zero, the corresponding detent-lever 104 is moved, causing the bail 106 to assume a different position which is effective to bring the interponent 107 into position where its end 107a underlies the end of the key-lever 108, and thereby thwarts the operation of said key-lever as shown in Figure 2. Thus it will be seen that the key-lever 108 is operable only when all the dial-wheels of the register which control it stand at zero, and said key-lever may be used to print an asterisk or star as an indication that said register is clear. The machine herein illustrated has two registers, and two key-levers 108 of the regular keyboard are used, each of which prints an asterisk or star of different design, one for each register. Each star key-lever is controlled by its own interponent 107, each interponent being in turn controlled by the bail 106 of the corresponding register. When a star key-lever is operated it is also desirable to actuate the usual pin-restoring platform, so that any index-pins which may have been idly set are restored. The means whereby this is accomplished will be described later on. Connection between the interponent 107 and the bail 106 is effected by means of a link 110 which connects an arm 111 to one of the side arms 112 of said bail. The connection to said side arm is made by means of a pin-and-slot connection 113, so that the bail 106 may be moved independently of the link 110 in a manner to be described. A spring 114 keeps the pin of said pin-and-slot connection normally engaged with the end of the slot.

An elimination key 141 projects through a front plate 142 of the computing mechanism, and, for the purpose of the present invention, is fastened to the end of a bar 143, the rear end of which has a bent-over tab 143a which is slotted in order to be guided by a shoulder-screw 144 fastened into the upper cover 145 of the computing mechanism. One of the functions of the elimination key is to directly restore by operation of said key any index-pins which may have been set, said restoration to be effected independently of a computing machine cycle. A computing machine cycle is initiated by the return stroke of the elimination key, after the forward stroke of said key has restored the index-pins, said cycle being thus initiated after such prior restoration of the index pins in order to restore all other parts of the computing mechanism to normal condition. The usual means for restoring said index-pins during a regular computing machine cycle by which an indexed amount is to be accumulated in the dial-wheels include a pin-restoring platform 146 for each set of rack-bars 60. Said platform by the usual means shown in the aforesaid patent to Hoyt is capable of being moved upward against the lower ends of the index-pins to effect restoration of said pins after the amount has been accumulated by means of said index-pins. The pin-restoring means also include a rotatable shaft 147 upon which is fastened, adjacent each restoring platform 146, an arm 148. The end of said arm engages a tab 149 projecting from the restoring platform 146. To cause said shaft 147 to be rotated by operation of the elimination key 141 and thereby raise the restoring platform 146, there is fastened to said shaft an arm 150. Said arm is connected by means of a link 151 to a bell-crank 152, which is pivoted upon a stud 153 fastened in the right-hand computing machine frame, not shown. A vertical arm 154 of said bell-crank is engaged by a projection 155 of the bar 143. When the elimination key 141 is operated in a forward stroke thereof, the bell-crank 152 is rotated, and consequently the restoring platform 146 is raised to restore any index-pins that may have been set.

As already stated, operation of any star-key also restores any index-pins that may have been set, and this is accomplished by causing the bell-crank 152 to be rotated by operation of either star-key-lever 103.

To this end, the end of each key-lever 108 is provided with a cam 108a. Said cam, when a key-lever is operated, is effective to rotate the corresponding interponent 107 counter-clockwise. A pin 156 is driven into the end of an arm 157, and each end of said pin overlies a corresponding arm 159 of each interponent 107. The arm 157 is connected to the bell-crank 152 by a hub 158. Operation of any star-key-lever 103, by means of the parts just described, causes the restoring platforms 146 to be elevated with a consequent restoration of any index-pins which may have been set. It will be noted that one of the interponents 107 is fastened to a shaft 109. The other of said interponents, of which there are two, is loosely mounted on said shaft, and has a direct connection to the link 110 by means of a U-shaped extension 101. The interponent which is fastened to the shaft 109 is connected to its corresponding link 110 by means of an arm 109a, which is also fastened to the shaft 109. The connections from each interponent to its corresponding bail 106 are shown in Figure 3. The shaft 109 may be supported between suitable extensions 110a of the side plates 111a which frame the dial-wheels 102.

The computing mechanism may be manually operated by the usual handle 253, indicated by the dotted line in Figure 1. Said handle 253 is attached in the usual manner to an operating cross-shaft 120.

One purpose of the pin-and-slot connection 113 and the spring 114 of the star-key mechanism is to provide a yieldable connection between one of the arms 112 and the link 110. This connection yields as the teeth which form the detent-notches 105 override the nose of a detent-lever 104, if the movement of the interponents 107 is limited, as shown in Figure 2, by the key-levers 108. The spring 114 also yields when operation of the key-lever 108 rotates the interponent 107 counterclockwise to restore index-pins that may have been set.

Figure 4 shows an alternative design of character to be printed by what would otherwise be the star-key-levers. This alternative design, as shown in said figure, may be numerals with a suitable border around each printed numeral to make it sufficiently distinctive.

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 combined typewriting and computing machine, the combination with a typewriter-key-lever manually operable to print, a plurality of computing wheels and indexible devices wherein an amount to be registered in said wheels may

be set up, of a shiftable interponent whereby the operation of said key-lever may be thwarted, means controlled by the rotary positions of said wheels whereby said interponent is caused to be effective or ineffective to thwart said operation of said key-lever, and means operatively connected to said interponent whereby said key-lever when operated unsets said indexible devices directly by the key-lever stroke, said key-lever being formed so as to be capable of shifting said interponent when the latter is in ineffective position.

2. In a combined typewriting and computing machine, the combination with a set of computing wheels, of clearance key-mechanism including a member adjacent the computing wheels, capable of assuming two positions depending on whether or not all of said wheels stand at a given position, said member having a vibratory movement as said wheels are rotated, a key-lever operable to print a clear sign, an interponent for preventing operation of said key-lever and movable into and out of effective position, the movement to effective position being limited by an abutment, and a yielding connection between said interponent and member whereby said interponent is effective or ineffective depending on the aforesaid positions of said wheels, said abutment and yielding connection co-operating to prevent the vibration of said interponent when the latter is in effective position and the wheels are rotated.

3. In a combined typewriting and computing machine, the combination with a set of computing wheels and a set of wheel-rotating members having settable digit-devices, of clearance key-mechanism including a typing key-lever operable to print a clear sign, means including an interponent for preventing operation of said key-lever, said interponent arranged to assume effective and ineffective positions depending on whether or not all of said wheels stand at a given position, and means operable by said interponent, when the latter is shifted from ineffective position in a direction contrary to its shift to effective position, for unsetting said digit-devices, said interponent and key-lever having co-operating camming formations for effecting such contrary shift, said camming formations being ineffective when said interponent is in effective position.

4. In a combined typewriting and computing machine, the combination with a set of computing wheels and a set of wheel-rotating members having settable digit-devices, of clearance key-mechanism including a member adjacent the computing wheels, capable of assuming two positions depending on whether or not all of said wheels stand at a given position, a key-lever operable to print a clear sign, an interponent for preventing operation of said key-lever, a yieldable connection between said member and said interponent, whereby said interponent is rendered effective or ineffective depending on the aforesaid positions of said wheels, and means operable by said interponent when the latter is shifted from its effective position in a direction contrary to its shift to effective position for unsetting said digit-devices, said key-lever when operated being capable of effecting said contrary shift and said connection being yieldable to permit said contrary shift.

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