

March 26, 1963

F. E. BECKER ETAL

3,082,854

TYPEWRITER INPUT CHECKING MECHANISM

Filed May 12, 1961

4 Sheets-Sheet 1

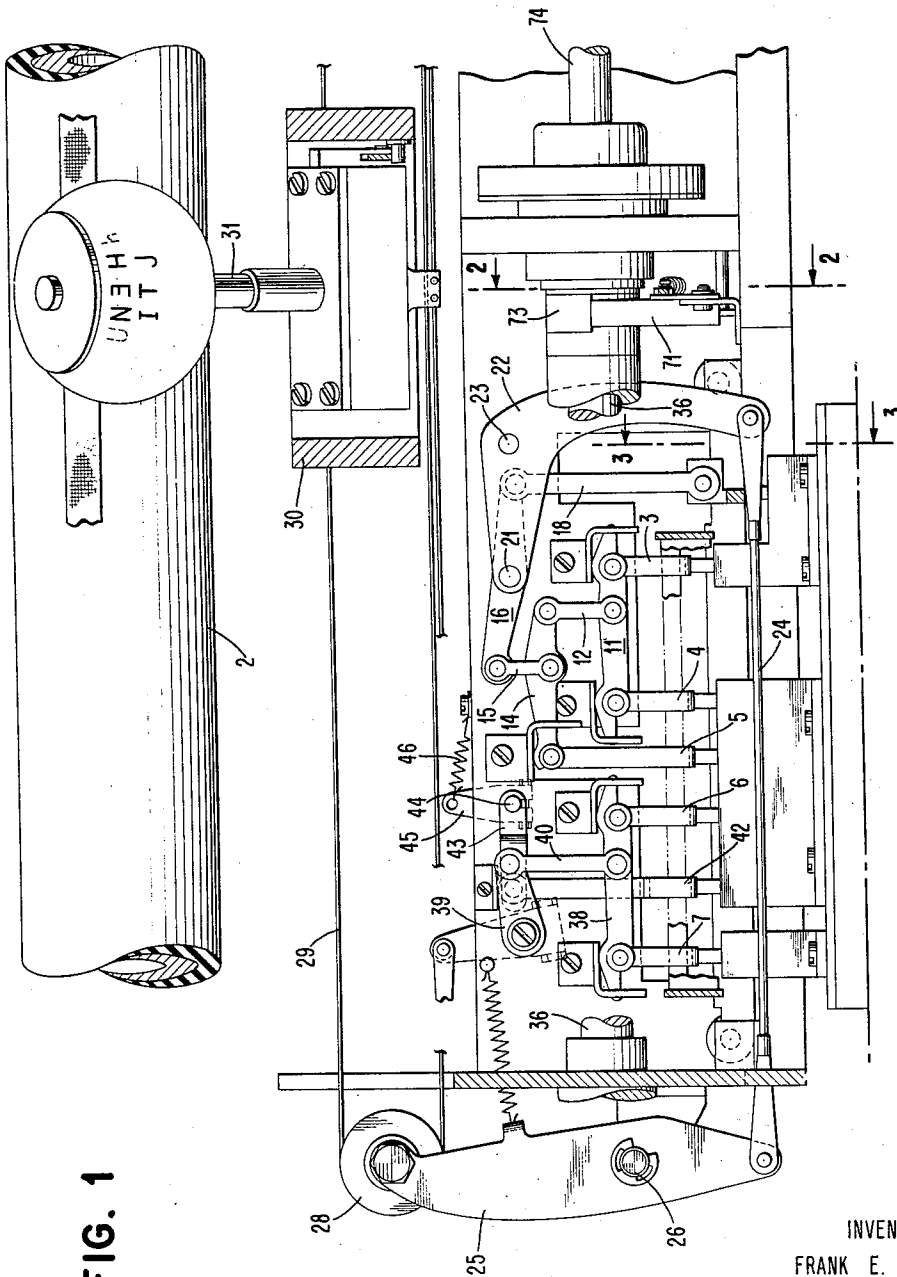


FIG. 1

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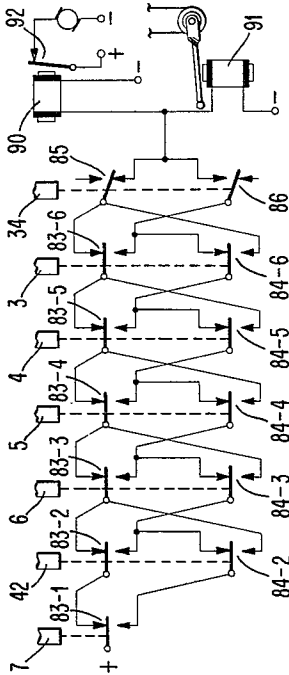


FIG. 4

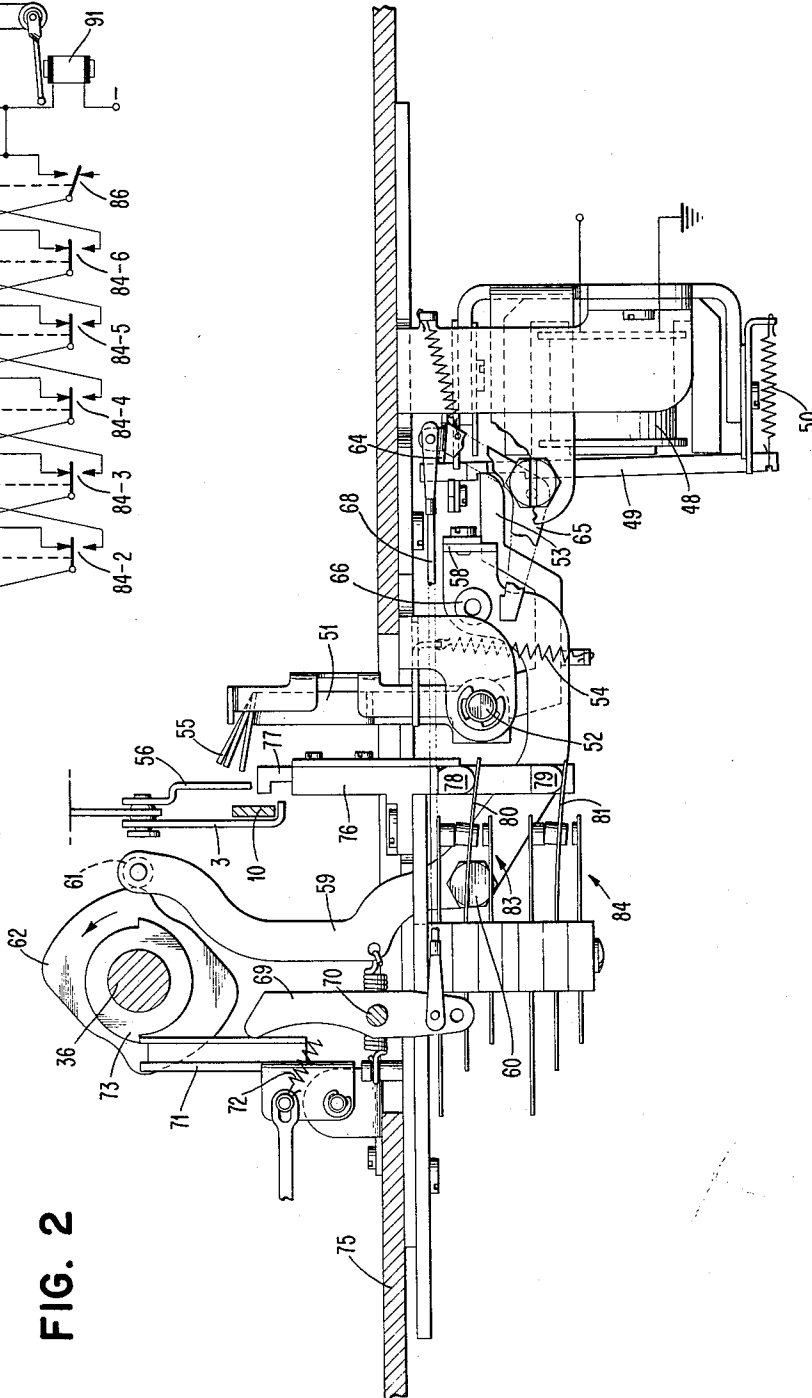


FIG. 2

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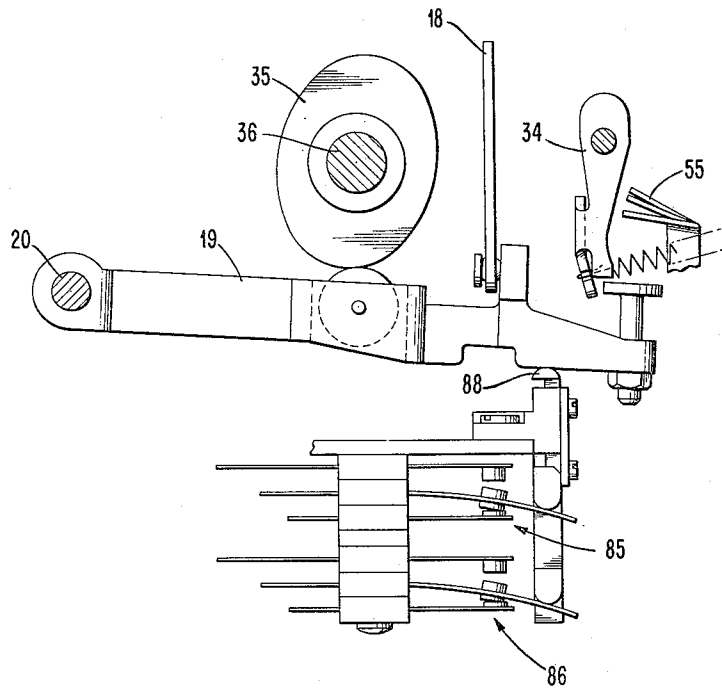
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FIG. 3



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FIG. 5

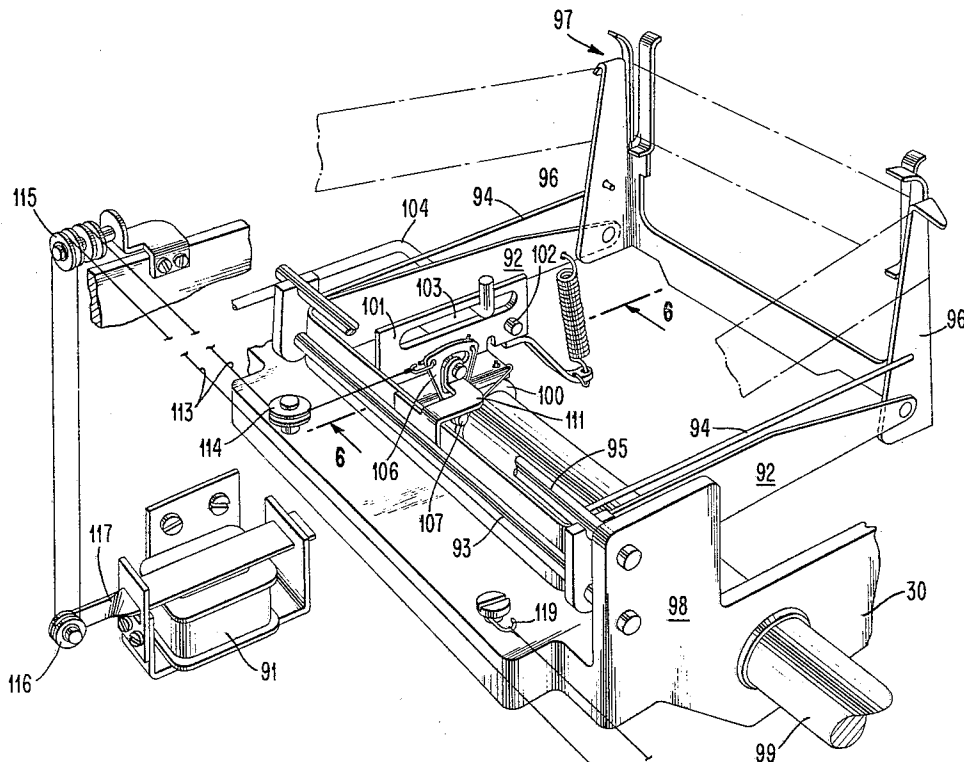
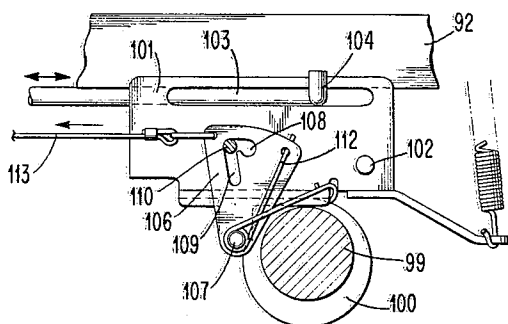


FIG. 6



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3,082,854

TYPEWRITER INPUT CHECKING MECHANISM

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8 Claims. (Cl. 197—19)

This invention relates to typewriters, and more particularly to mechanisms incorporated in a typewriter for effecting its operation in response to signals received from a remote point, the mechanisms including means which operate when an incorrect signal is received for warning the operator and stopping operations until corrections are made.

There is shown in U.S. Patent 2,919,002 issued to L. E. Palmer a typewriter having a single element type head mounted on a carrier which moves longitudinally of a platen. Various selecting links or latches are controlled by key levers to effect their operation in different combinations for rotating and tilting the type head so as to present any one of its characters in typing position.

It is desirable that a typewriter like that of the Palmer patent be provided with means which cause it to operate in response to signals received from a remote point. By including means which can determine whether or not a signal received is correct, it is possible to warn the operator and to stop the typewriter or signal transmitting system when an incorrect signal is received.

An object of this invention is to provide an improved typewriter.

Another object is to provide a typewriter which is adapted to operate in response to signals received from a remote point.

Still another object is to provide a typewriter having embodied therein an improved mechanism which adapts it for operation in response to signals received from a remote point and which warns the operator and stops operations when an incorrect signal is received.

Other objects of the invention will be pointed out in the following description and claims and illustrated in the accompanying drawings, which disclose, by way of example, the principle of the invention and the best mode, which has been contemplated, of applying that principle.

In the drawings:

FIG. 1 is a front elevational view of a mechanism which is operable to rotate and tilt a type head relative to a platen.

FIG. 2 is an enlarged sectional view taken on the plane of the line 2—2 in FIG. 1 and showing a latch positioning means with a clutch controlled thereby.

FIG. 3 is a sectional view taken on the plane of the line 3—3 in FIG. 1.

FIG. 4 is a circuit diagram.

FIG. 5 is a perspective view of a ribbon lift mechanism.

FIG. 6 is an enlarged sectional view of the ribbon lift mechanism taken on the line 6—6 in FIG. 5.

There is shown in FIG. 1 of the drawings a mechanism similar to that of the Palmer patent for rotating and tilting a print head 1 to present any one of the characters thereon in printing position relative to a platen 2. This mechanism includes a plurality of selecting links or latches, numbered 3 to 7, having hooked shaped portions at their lower ends normally lying under a bail 10 as shown more clearly in FIG. 2. Latches 3 and 4 are connected at their upper ends to a floating member 11 in such a way that they may swing forwardly relative to the member and also permit pivotal movement of the latter about either connection. A link 12 pivotally connects the member 11 to one end of another floating member 14, and the other end of the member 14 is connected

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to the latch 5. Connected between the ends of the member 14 is a link 15 which is also pivotally connected to one end of an elongated member 16. The other end of the member 16 is connected by a link 18 to a lever 19 (see FIG. 3) mounted on a pivot pin 20. A point between the ends of the member 16 is connected by a pin 21 to one arm of a bellcrank 22 which is pivotally mounted on a pin 23. Another arm of the bellcrank is connected by a link 24 to one end of a lever 25 which is supported by a pivot pin 26. The other end of lever 25 carries a pulley 28, and a tape 29 passes about this pulley and is connected at its ends, as shown and described in the above mentioned Palmer patent, to a carrier 30 and to a pulley, not shown, on a spindle 31 for the type head so as to effect rotation of the latter in response to an operation of the lever 25.

When one or more of the latches 3, 4 and 5 are under the bail 10 as the latter swings downwardly, the latches are actuated by the bail to effect a swinging of the bellcrank 22 and the lever 25 for rotating the type head 1 from a home position against the action of a spring, not shown. A downward pull on any one of these latches tends to rock the member 16 about the pin 21 in a direction to move the link 18 upwardly. As shown in FIG. 3, the lever 19 to which the link 18 is connected, is normally held against an upward swinging movement by a latch member 34. When the latches 3, 4 and 5 are moved downwardly either singularly or in combinations and the lever 19 is latched in the position shown, the type head is caused to rotate clockwise from its home position one to five units of angular distance to present any one of five columns of characters in printing position. If the latch member 34 is disengaged from the lever 19, the latter swings upwardly under control of a cam 35 on a shaft 36 and permits the bellcrank 22 to swing in a clockwise direction under the action of the spring which tends to rotate the type head counterclockwise. The movement permitted by the cam 35 is such that the type head rotates five units in a counterclockwise direction. If one or more of the latches 3, 4 and 5 are actuated simultaneously with the upward movement of the link 18, the actual rotation of the type head is equal to the difference between the rotations normally produced by the latches and that produced by movement of the link 18. In this manner, a rotation of the type head counterclockwise from its home position one to five units may be obtained.

The latches 6 and 7 are connected to a floating member 38 which is connected at a point between its ends to a lever 39 by a link 40. Lever 39 is connected by mechanisms shown in the above mentioned Palmer patent to the type head for tilting the latter one to three units distance depending on whether one or both of the latches 6 and 7 are operated. The mechanism connecting the lever 39 to the type head has not been shown herein because it forms no part of the present invention.

In the Palmer patent the selecting latches are positioned relative to their actuating bail by links which are actuated in response to the operation of key levers. This patent also shows means operated by key levers for releasing a latch member similar to the member 34. It will be appreciated that selective operations of the latches 3, 4, 5, 6, 7 and 34 effect a positioning of the type head for printing various characters. By providing electromagnets which operate when energized to move the latches selectively to inoperative positions, it is possible to obtain a positioning of the type head by electric pulses transmitted from a remote point. This means that a positioning of the type head for printing any character may be obtained by pulsing one or more of six electromagnets.

It is common practice when operating mechanisms by combinations of pulses representative of characters, to

deliver either an even or an odd number of pulses for each character. The system of this invention is designed to operate on odd combinations of pulses for each printing operation. If the character to be typed is represented by an even number of pulses, then a check pulse is also transmitted so the total number of pulses is odd. When the character is represented by an odd number of pulses, then no check pulse is transmitted because the number is already odd. With systems of this type, it is possible to detect a single error which results from either the failure of any one of the pulse actuated mechanisms to operate or the failure of the transmitting apparatus to deliver the correct number of pulses. The mechanism by which the detection of an error is made possible will be described shortly.

Arranged between the latches 6 and 7 in FIG. 1 is a latch 42 which is like the other selecting latches and may be actuated by the bail 10 but it has no effect on the positioning of the type head. Latch 42 is pivotally connected to an arm 43 fixed to a rod 44, and another arm 45 on the rod is urged by a spring 46 in a direction to hold the latch 42 in a raised position. Associated with each of the latches 3 to 7, 34 and 42 is a magnet 48 (FIG. 2) having an armature 49 which is normally held in the position shown by a spring 50. Cooperating with each armature is a member 51 which is pivotally supported at 52 and has a tail portion 53 adapted to be latched by the armature against actuation by a spring 54. The member 51 carries fingers 55 engageable with an arm 56 fixed to the latch with which the magnet is associated. Extending across the tail portions 53 is a bail 58 carried by members 59 which are pivotally supported between their ends at 60 and carry followers 61 engaging cams 62 on the shaft 36. When the cam 62 is in its home position as shown in FIG. 2, the bail 58 holds the tail portions 53 of the members 51 just below latching shoulders on the armatures 49. Extending along the back side of the armatures is a bail 64 which is connected at its ends to bell cranks 65. A slight clearance exists between the left ends of the bellcranks and studs 66 projecting from the sides of the members 59. An energizing of any one of the magnets 58 in a movement of its armature out of the path of the associated tail portion 53 and, at the same time, in a rocking of the bail 64 in a clockwise direction. Connected to one end of the bail 64 is a link 68 which operatively engages a lever 69 mounted on a stationary pivot pin 70. Lever 69 acts against a pivotally supported latch 71 which is normally held by a spring 72 in a position to engage a shoulder on a clutch element 73 of a single revolution clutch shown and described more completely in the Palmer patent.

An energizing of any one or more of the magnets 58 causes their armatures 49 to move out of the paths of the tail portions 53 and to rock the bail 64 for effecting a swinging of the lever 69 to disengage the latch 71 from the clutch element 73. This results in an operation of the clutch to connect a continuously rotating shaft 74 (FIG. 1) to the shaft 36 for driving the latter one revolution. Shortly after the shaft 36 starts rotating, the cam 62 permits the members 59 to swing counterclockwise for raising the bail 58. Any member 51 whose tail portion 53 is not engaged by its armature latch follows the bail 58 until the fingers 55 engage the arm 56 and move the associated selecting latch from under the bail 10. The other members 51 move with the bail 58 until they engage their armature latches and are held by the latter. Further rotation of the shaft 36 causes the bail 10 to be rocked downwardly as described in the Palmer patent, and to pull with it an selecting latches not removed from its path. After the selecting latches have been actuated, the cam 62 rocks the members 59 to move the bail 58 downwardly and return the members 51 to their home positions. The members 59 are first swung downwardly slightly beyond home position so the studs 66 rock the bellcranks 65 for knocking off any armatures that are

held by residual magnetism in the magnets 49. Cam 62 then permits the members 59 to swing slightly counterclockwise to provide clearance between the armatures 55 and the studs 66 but not far enough to engage the tail portions 53 with the latch shoulders on the armatures.

Attached to a supporting plate 75 at a point beneath each of the latches 3 to 7 and 42 is a bracket 76 slidably supporting a plunger 77 in vertical alignment with the arm 56. Formed on the plunger are two projecting portions 78 and 79 acting on spring arms 80 and 81 which carry contacts cooperating with pairs of contacts 83 and 84. The spring arms normally hold the plungers in raised positions, as shown in FIG. 2, with the contacts on the spring arms engaging the upper one of each pair of contacts. The latch 34 is not operated by the bail 10 and so there is provided, as shown in FIG. 3, two pairs of transfer contacts 85 and 86 which are controlled by a plunger 88 acting against the lower side of the lever 19. When the lever 19 is held by the latch 34 against operation, the plunger 88 is maintained in a position establishing circuits through the lower one of the pairs of contacts. An energizing of the magnet associated with the latch 34 results in release of the latter from the lever 19 so it swings upwardly under control of the cam 35 to establish circuits through the upper one of the pairs of contacts.

The pairs of contacts for the latches 3 to 7, 34 and 42 are shown in FIG. 4 arranged in the same order in which the latches are shown in FIG. 1. The upper pairs of contacts, except for latch 34, have been designated 83-1 to 83-6. No contacts have been shown in the lower position for latch 7 since they are not needed. The lower pairs of contacts used with the selecting latches have been designated 84-2 to 84-6. The upper and lower pairs of contacts for latch 34 have been designated 85 and 86, the same as in FIG. 3.

It will be appreciated that an energizing of any one of the magnets 48 for the latches 3 to 7 and 42 will result in a removal of its corresponding latch from the path of the bail 10 so its contacts will not be transferred. All of the other latches remaining under the bail will be actuated. Since latch 34 is not actuated by the bail 10, its contacts will transfer only when the magnet 48 associated therewith is energized. The contact arm for the pair of contacts 83-1 is connected, as shown in FIG. 4, to the positive side of a voltage supply. Connections are provided between the contact arms in such a way that any odd number of electric pulses received from a remote point will result in a connection from contacts 83-1 to one of the outer contacts 85 or 86. For instance, assuming a pulse is received for energizing magnet 48 for the latch 7, then the contact arm for this latch remains in the position shown and all of the contact arms, except those for latch 34, are transferred by the bail 10. It will be seen that a circuit then extends from contacts 83-1 (normally closed) through the normally open contacts 83-2, 84-3, 83-4, 84-5, 83-6 and the normally closed contacts 86. The normally closed contacts 86 do not lead to anything and so nothing happens as a result of the transferring of contacts. Movement of the armature 49 for the magnet controlling latch 7, however, causes an actuation of the bail 64 for releasing the clutch element 73 to effect a driving of the shaft 36 one revolution. The selecting latches at the other positions are actuated by the bail 10 to position the type head, and, after this has taken place, the type head is engaged with the platen as described in the Palmer patent for printing the selected character.

If pulses had been delivered to two or any other even number of magnets 48 for the latches, then a different result would have been obtained. Assuming that pulses had been delivered to magnets 48 for latches 6 and 7, then the contacts for these latches would have remained in the positions shown and the contacts for latches 1 to 5 and 42 would have been transferred. Contacts for latch 34 would also remain in the positions shown. The circuit would then extend through contacts 83-1 (normally closed), contacts 83-2 (normally open), 84-3 (normally

closed), the normally open contacts 84-4, 83-5, 84-6, and the normally closed contacts 85 to an error relay 90 and a ribbon shift magnet 91. Mechanisms actuated by the ribbon shift magnet will be described shortly. An energizing of the error relay 90 opens contacts 92 which may be connected either in a circuit to the pulse transmitting system or in a circuit to a motor driving the shaft 74, or both. In any case, the typing of information is stopped, and the last character is typed in red to indicate that it resulted from an incorrect operation.

Electric pulses representing characters are delivered to the magnets for latches 1 to 7 and 34. When any combinations of these pulses are even, a check pulse is delivered to the magnet for the latch 42. An operation of the latch 42 has no effect on the positioning of the type head but it does have an effect on the circuit through the contacts which are controlled by the latches. With the contacts arranged in positions for direct actuation by the latches, the circuit obtained is representative of the position taken by the type head since the latter is also connected directly to the latches. When the pulse transmitting system is operated correctly, an odd number of pulses will always be delivered to the magnets 48 controlling the latches. If an error is made and an even number of pulses is delivered to the magnets, or if one of an odd number of pulses fails to move its corresponding latch from under the bail 10, then a circuit is completed to the error relay 90 and the ribbon lift magnet 91.

Referring to FIG. 5 is will be noted that there is shown a ribbon lift mechanism similar to that shown and described by Patent 2,919,008 issued December 29, 1959, to W. B. Whippo. This mechanism includes a U-shaped member having lower lift arms 92 and a base portion rigidly fixed to a rod 93. Another U-shaped member has upper lift arms 94 and a base portion fixed to a rod 95. The outer ends of the arms are pivotally connected to side portions 96 of a ribbon guide 97. Rods 93 and 95 are rotatably supported at their ends in a flange 98 of the carrier 30 on which the type head is mounted as shown in FIG. 1. Extending through the carrier is a shaft 99 which is caused to make one revolution on each print cycle. Mounted on shaft 99 is a cam 100 engaging a follower plate 101 which is pivoted at 102 on the carrier. Formed in the plate 101 is an elongated slot 103 slidably receiving a rod 104 on which one of the lower lift arms 92 rests. As the plate 101 is swung upwardly by the cam 100, the rod 104 moves upwardly with it and swings the U-shaped members about the axes of their rods 93 and 95. The distance which the guide 97 is lifted depends on the position of the rod 104 in the slot 103. This is normally set to lift the guide from a position in which the operator can see the typed information to a position in which the upper half of the ribbon is between the selected character on the type head and the platen.

When an error occurs and the contacts of FIG. 4 complete a circuit to the ribbon lift magnet 91, it is desired that the ribbon be lifted higher to present a red inked portion in printing position. This is accomplished herein by mounting a latch plate 106 on a pivot pin 107 carried by the follower plate 101. Formed in the plate 106 is a slot having a horizontal branch 108 (FIG. 6) which joins at one end with a vertical branch 109. Extending through the slot is a pin 110 carried by an arm 111 (FIG. 5) which is fixed to the base portion of the U-shaped member having the lift arms 92. A spring 112 normally holds the plate 106 in a position with the pin 110 at the junction of the slot portions 108, 109. As the shaft 99 rotates while the plate 106 is in the position shown, the follower plate 101 is swung upwardly and acts through the rod 104 to lift the ribbon guide a distance inversely proportional to the distance between the axis of the rod 93 and the position of the rod 104 in the slot 103. The pin 110 moves during this time in the vertical portion 109 of the slot. Connected to the plate 106 is a cord 113 which passes around guide pulleys 114 and 115, a pulley 116 on an armature 117 for

the magnet 91, and a guide pulley 118 to an anchor 119 on the carrier 30. As the carrier moves along the platen to locate the type head in different printing positions, the cord 113 merely passes over the pulleys without changing the position of the plate 106. When the magnet 91 is energized and attracts its armature 117, the cord 113 moves the plate 106 to a position in which the pin 110 is received in the rear portion of the slot 108. When the follower plate 101 is then rocked upwardly, the pin 110 is lifted and acts through the arm 111 to rock the lift arms 92. The lifting of these arms is greater than it was before since the effective length of the arm 111 is less than that obtained when operating through the rod 104. With the magnet 91 energized, the ribbon is lifted to a position in which its lower half, or red inked portion, is between the type head and the platen. The character typed in red is an indication to the operator that an error occurred and the character typed is not correct. Simultaneous with this typing operation, the contacts of the error relay are opened to shut down the system until corrections can be made.

While there has been described in this specification one form which the invention may assume in practice, it will be understood that it may be modified and embodied in other forms without departing from the spirit of the scope of the appended claims.

What is claimed is:

1. In a typewriter having a single type head which is movable to present different characters thereon in printing position relative to a platen, a plurality of elements operatively connected to said head and movable individually between operative and inoperative positions, means for moving said elements so that predetermined combinations, representative of characters to be printed, are in operative positions, means for actuating said elements in operative positions to move said type head to a position for printing the character represented, contacts associated with each of said elements and adapted to be operated by the latter when actuated, means operating on movement of any one of said elements to effect an operation of said actuating means, an electrically actuated means for indicating an error when energized, and circuits including said contacts for energizing said electrically actuated means when the combination of elements actuated is not one of said predetermined combinations.

2. The typewriter of claim 1 in which said means for said elements includes electromagnets, one for each of said elements, said electromagnets adapted to be pulsed individually for determining combinations of elements to be actuated.

3. In a typewriter having a single element type head which is movable to present characters thereon in printing position relative to a platen, a plurality of latch elements operatively connected to said head and movable between operative and inoperative positions, said elements normally lying in operative positions, means for moving said elements selectively to inoperative positions so that predetermined combinations of them representative of characters to be printed remain in operative positions, means for actuating said elements in operative positions to move said type head to a position for printing the character represented, transfer contacts associated with each of said elements and adapted to be operated by the latter when actuated, means operating on movement of any one of said elements to its inoperative position for effecting an operation of said actuating means, an electrically actuated device for indicating an error when energized, and circuits including said contacts for energizing said electrically actuated device when the combination of elements actuated is not one of said predetermined combinations.

4. The typewriter of claim 3 in which said electrically actuated device comprises a ribbon lift mechanism, said lift mechanism normally operating to lift the ribbon to a given position for printing therefrom in one color, a lift member movable to an operative position for effecting a lifting of the ribbon to a different position for printing there

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therefrom in a second color, and means adapted to be energized by said circuits for moving said lift member to its operative position.

5 5. The typewriter of claim 3 in which said means for moving said elements to inoperative positions comprises members engageable with said elements, a spring for using each of said members in a direction to engage the one of said elements associated therewith, a magnet having an armature normally engaging each of said members for latching it against movement by said spring, a bail for controlling movement of said members which are unlatched by said armatures, and means including a cam operating simultaneously with said actuating means for rocking said bail in a direction to engage any of said unlatched members with said elements.

6. The typewriter of claim 3 in which said electrically actuated device comprises an error relay having contacts which are normally in a position to effect an operation of said typewriter, said relay contacts operating when said relay is energized for stopping typing operations.

7. In a typewriter having a single element type head which is movable to present characters thereon in printing position relative to a platen, a plurality of latch ele-

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ments movable between operative and inoperative positions, means normally holding said elements in their operative positions, means connecting all but one of said latch elements to said type head, means for actuating said elements when in operative positions to move said type head through said connecting means, means for moving said elements selectively to their inoperative positions so that predetermined combinations of elements representative of characters to be printed remain in their operative positions, transfer contacts associated with each of said elements and adapted to be operated by the latter when actuated, means operating on movement of any one of said elements to its inoperative position for effecting an operation of said actuating means, an electrically actuated device for indicating an error when energized, and circuits including said transfer contacts for energizing said electrically actuated device if elements other than said predetermined combinations are actuated.

8. The typewriter of claim 6 in which said transfer contacts complete a circuit to said error indicating device when the number of selecting latches actuated is even.

No references cited.

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,082,854

March 26, 1963

Frank E. Becker et al.

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 3, line 42, for "58" read -- 48 results --;
line 51, for "58" read -- 48 --; same column 3, line 69, for
"an" read -- any --; column 6, line 45, after "for" insert
-- moving --; line 75, strike out "there"; column 7, line 6,
for "using" read -- urging --.

Signed and sealed this 28th day of April 1964.

(SEAL)

Attest:

ERNEST W. SWIDER

Attesting Officer

EDWARD J. BRENNER

Commissioner of Patents