

Jan. 2, 1962

H. A. REITFORT

3,015,377

CONSOLE TYPEWRITER BIT PRINTING

Filed March 25, 1960

11 Sheets-Sheet 1

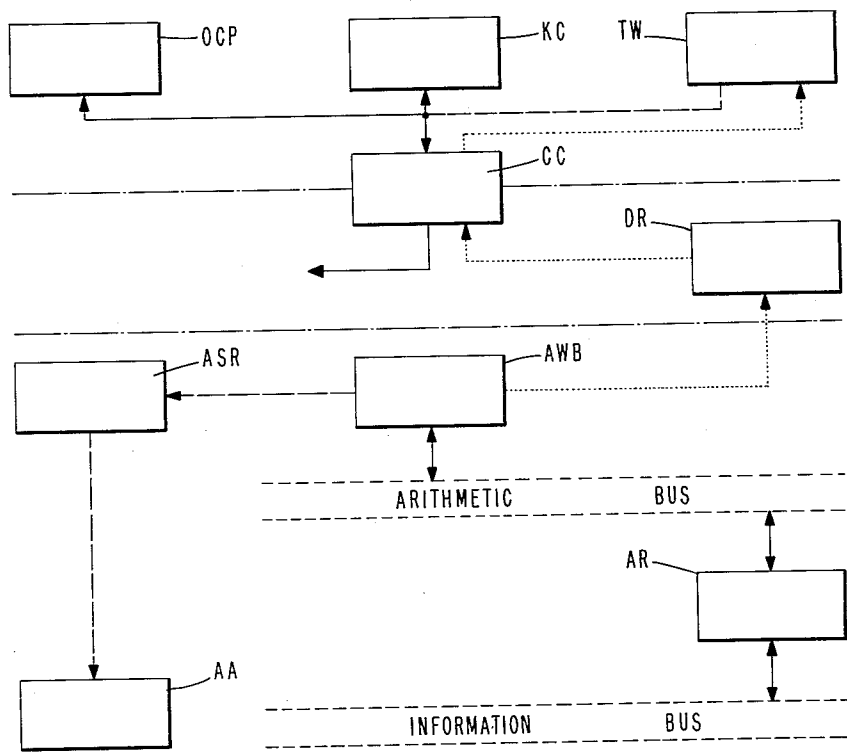


FIG. 1

FIG. 2a	FIG. 2b	FIG. 2c	FIG. 2d	FIG. 2e
FIG. 2f	FIG. 2g	FIG. 2h	FIG. 2i	FIG. 2j

FIG. 3

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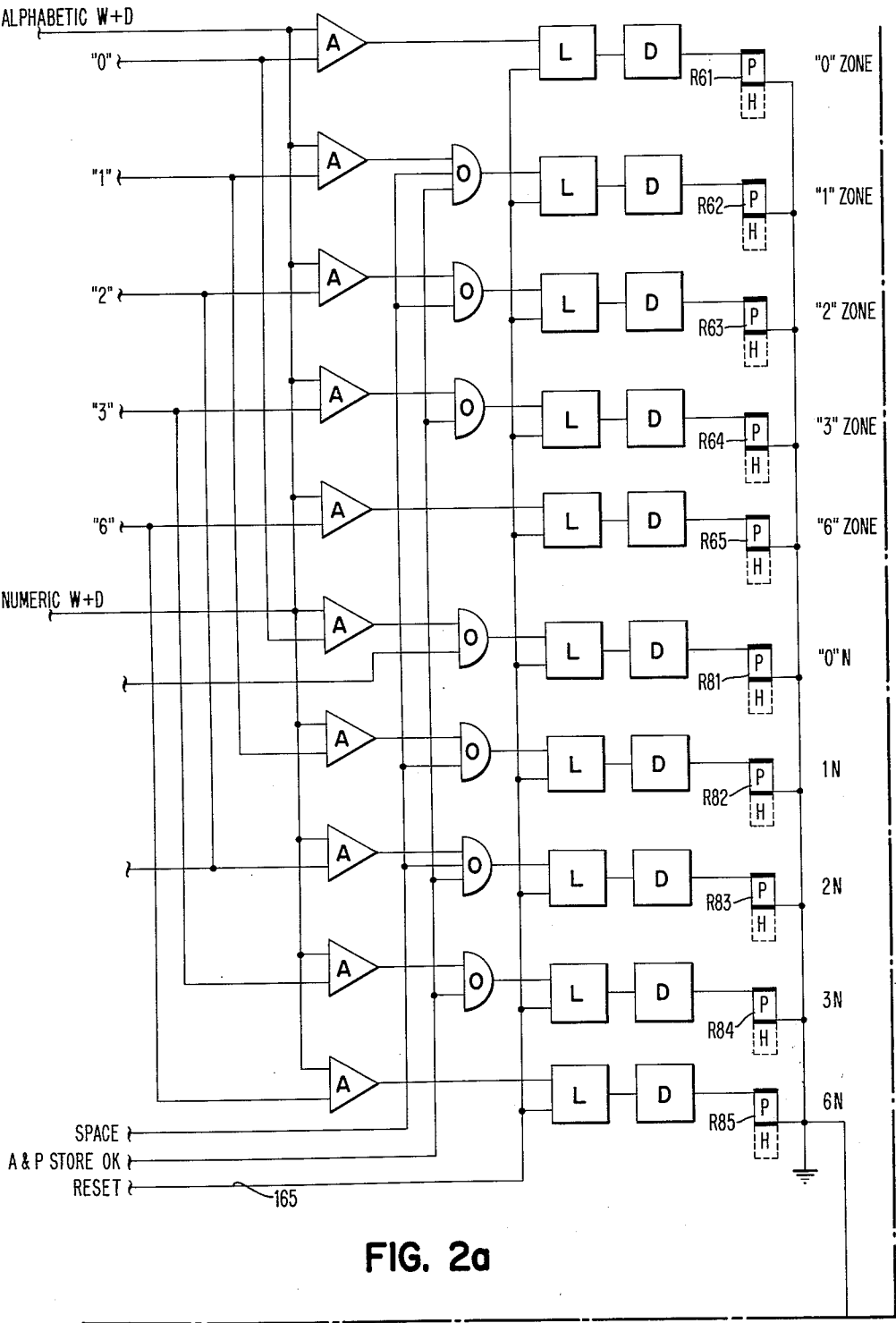
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11 Sheets-Sheet 2



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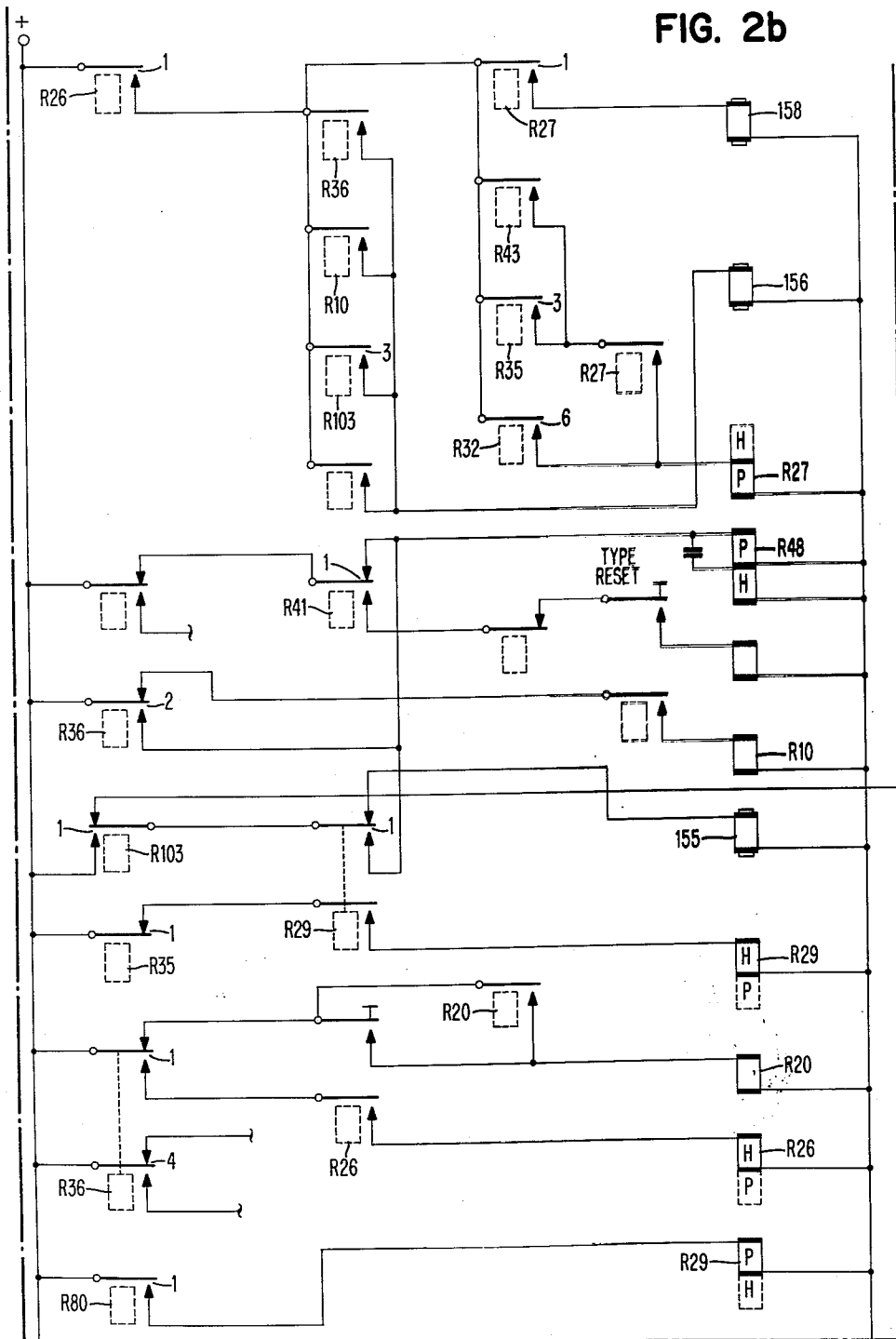
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11 Sheets-Sheet 3

FIG. 2b



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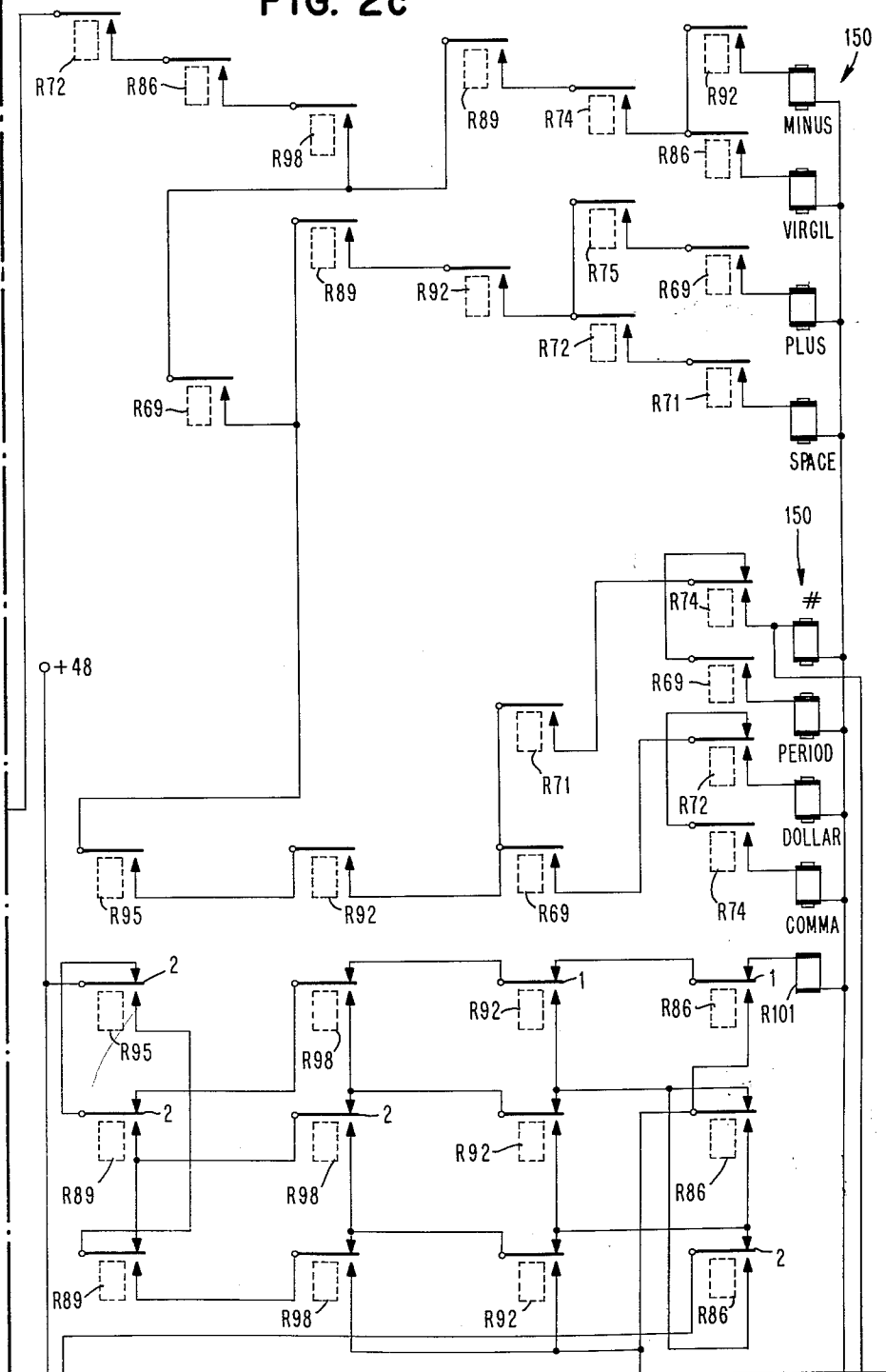
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FIG. 2c



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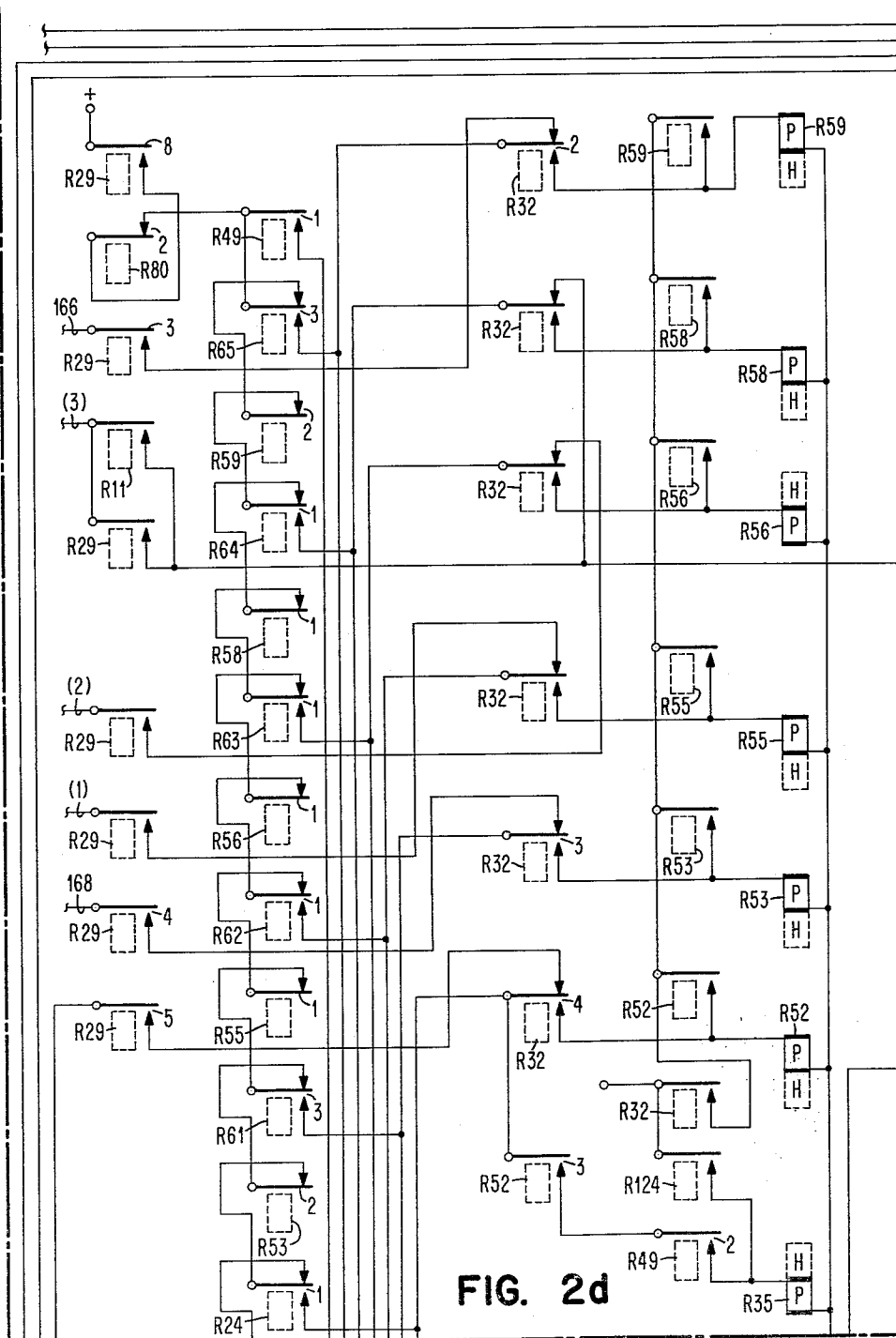
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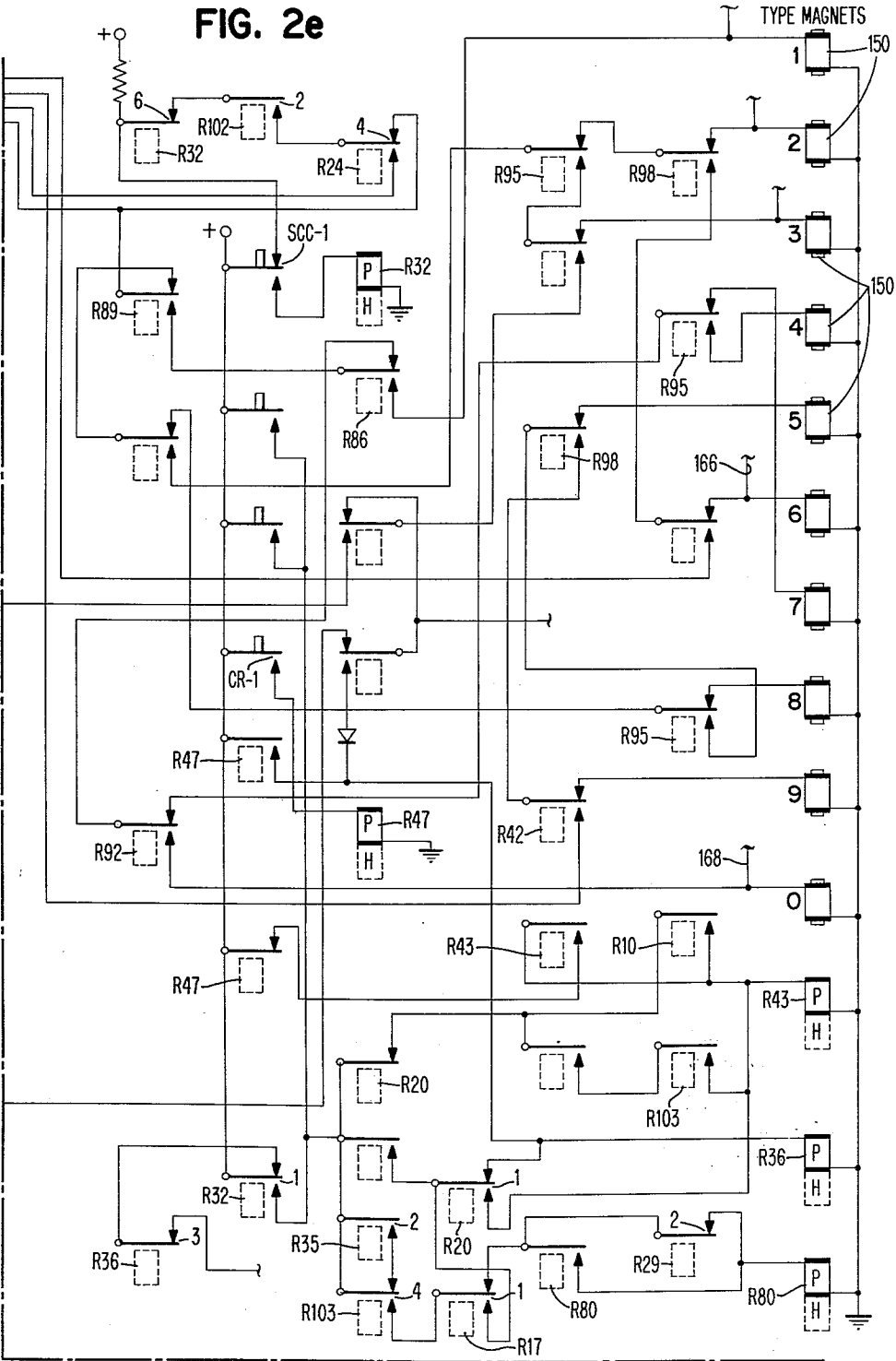
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FIG. 2e



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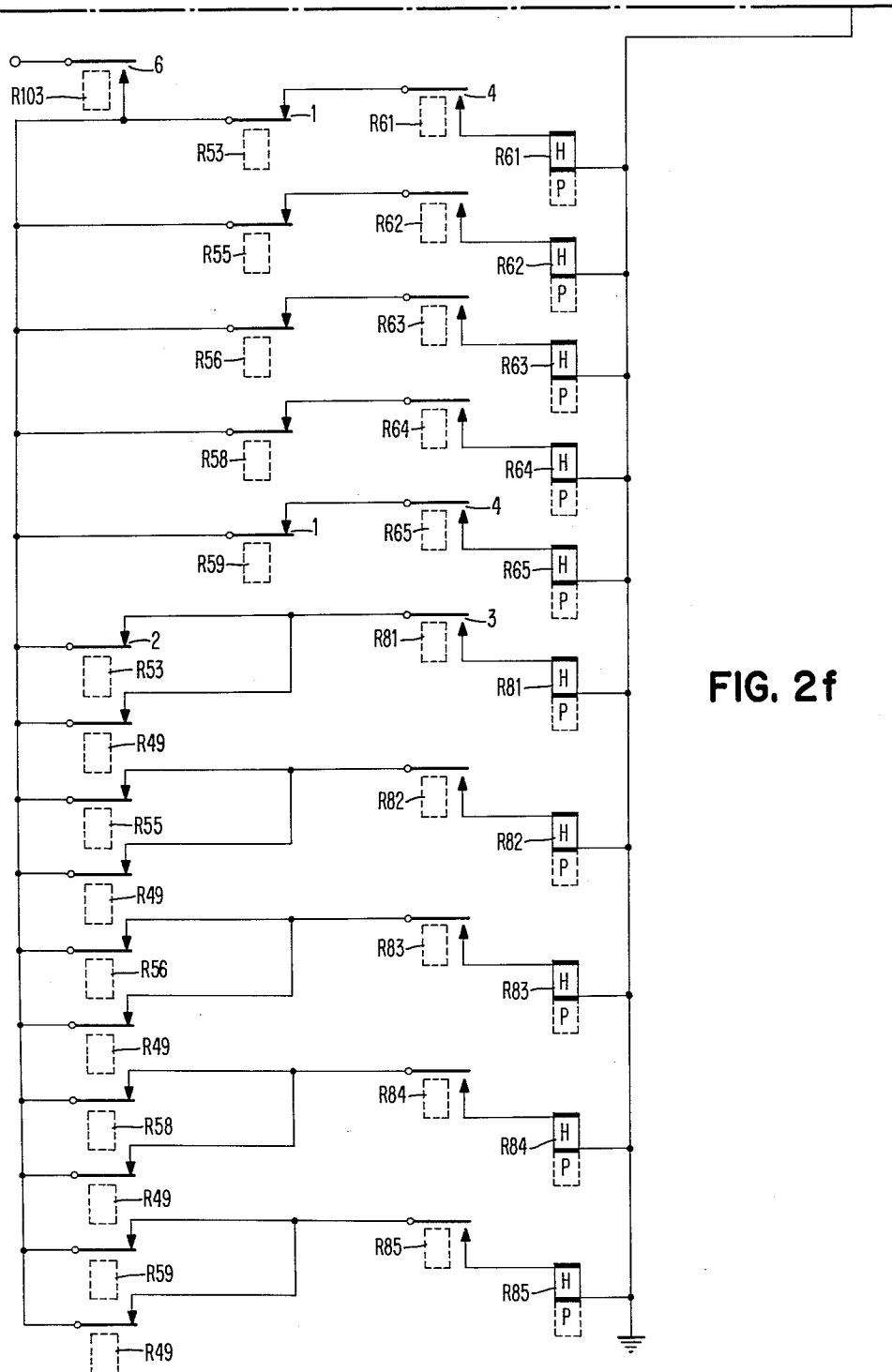
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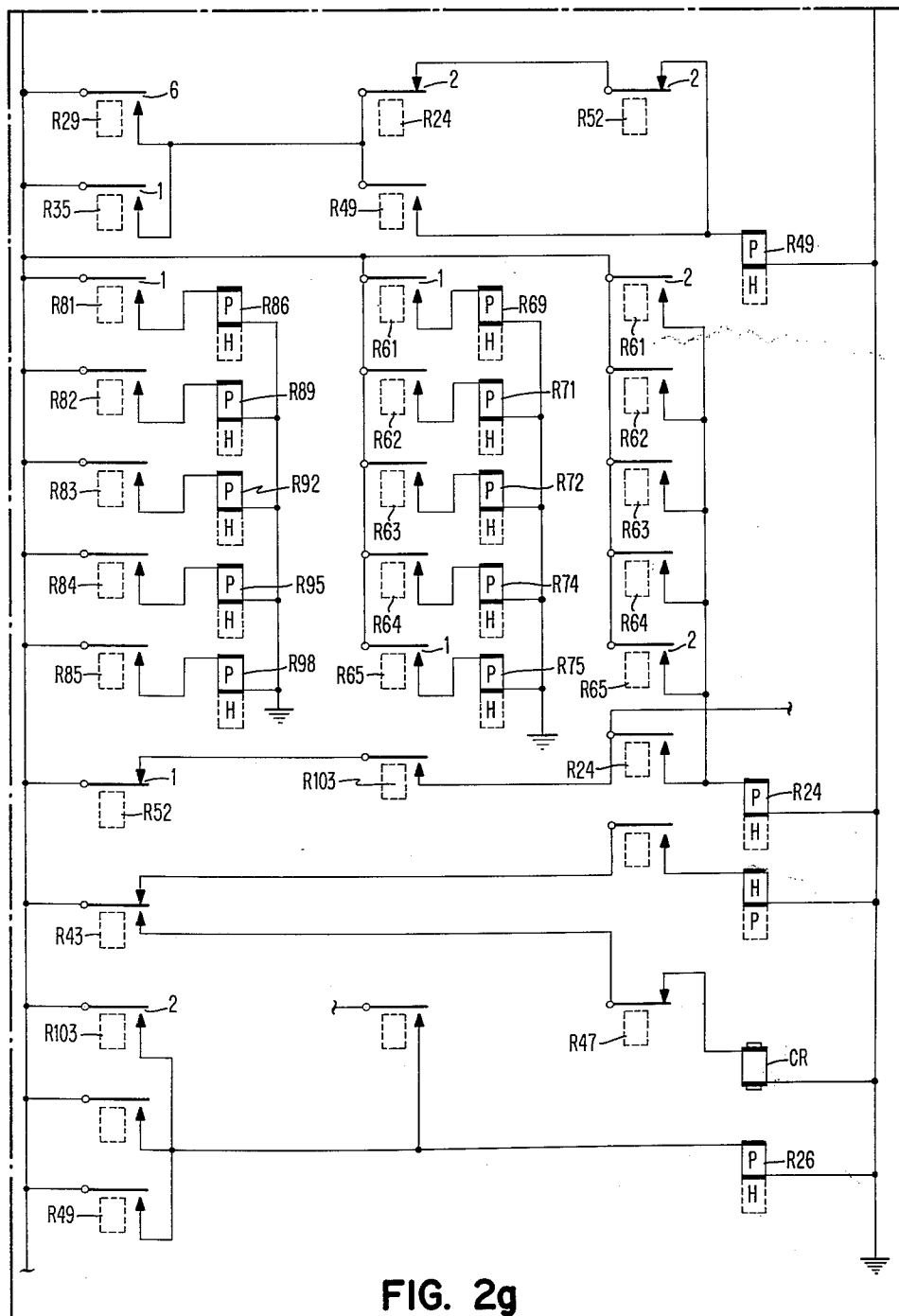
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11 Sheets-Sheet 9

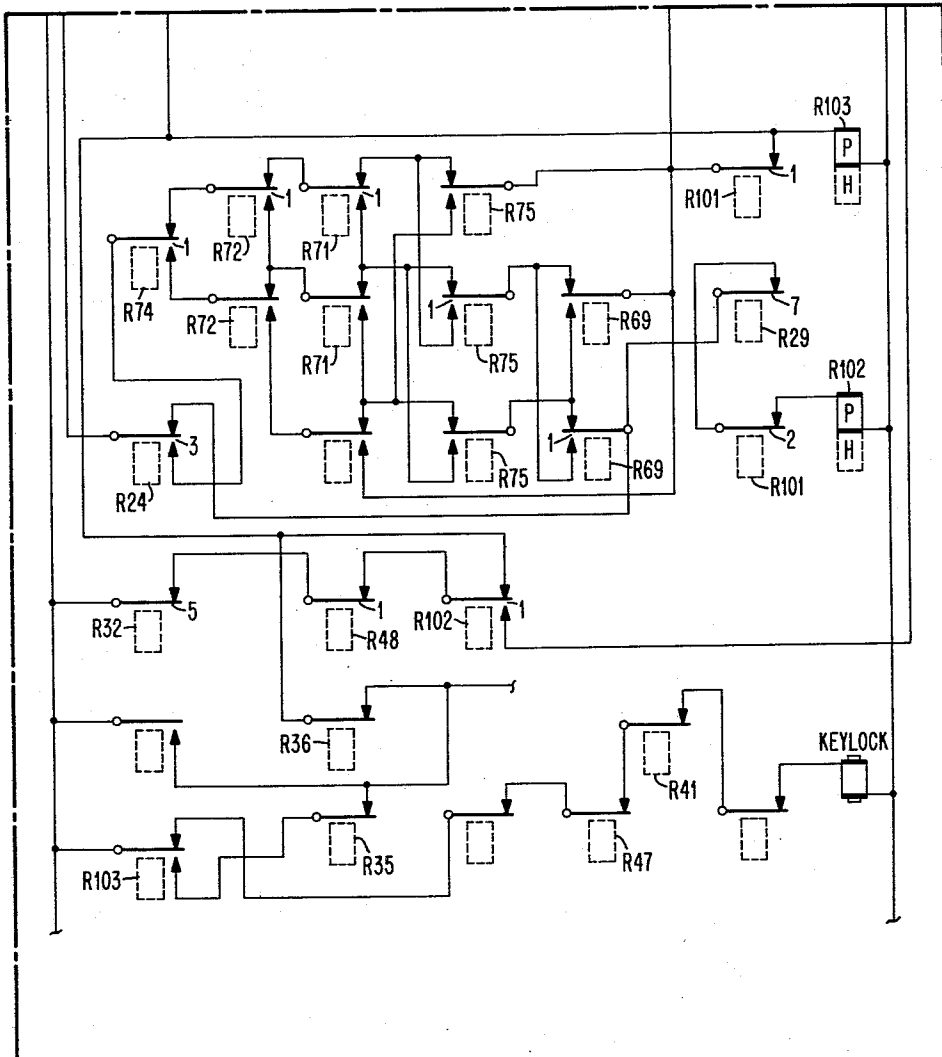


FIG. 2h

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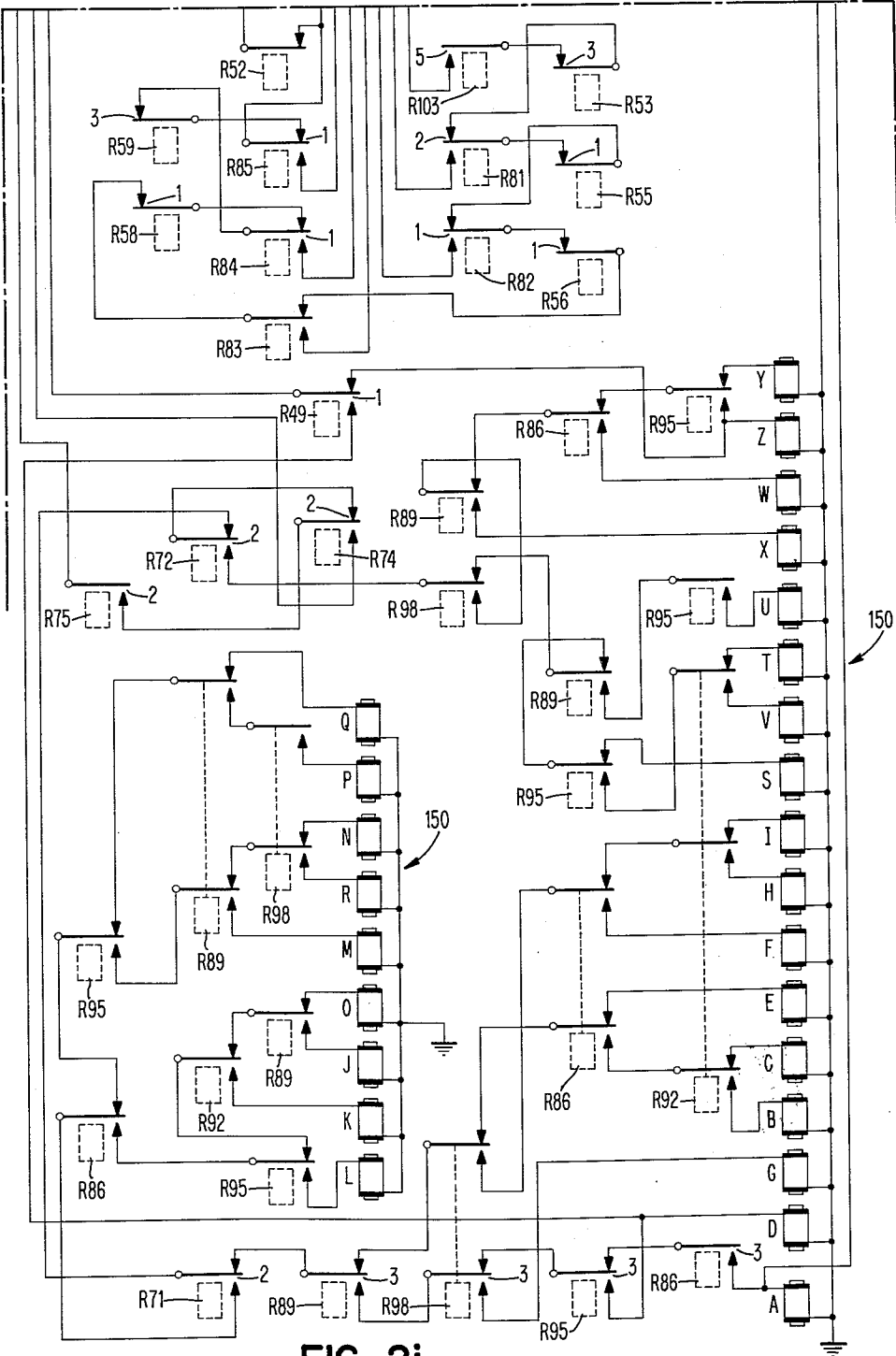
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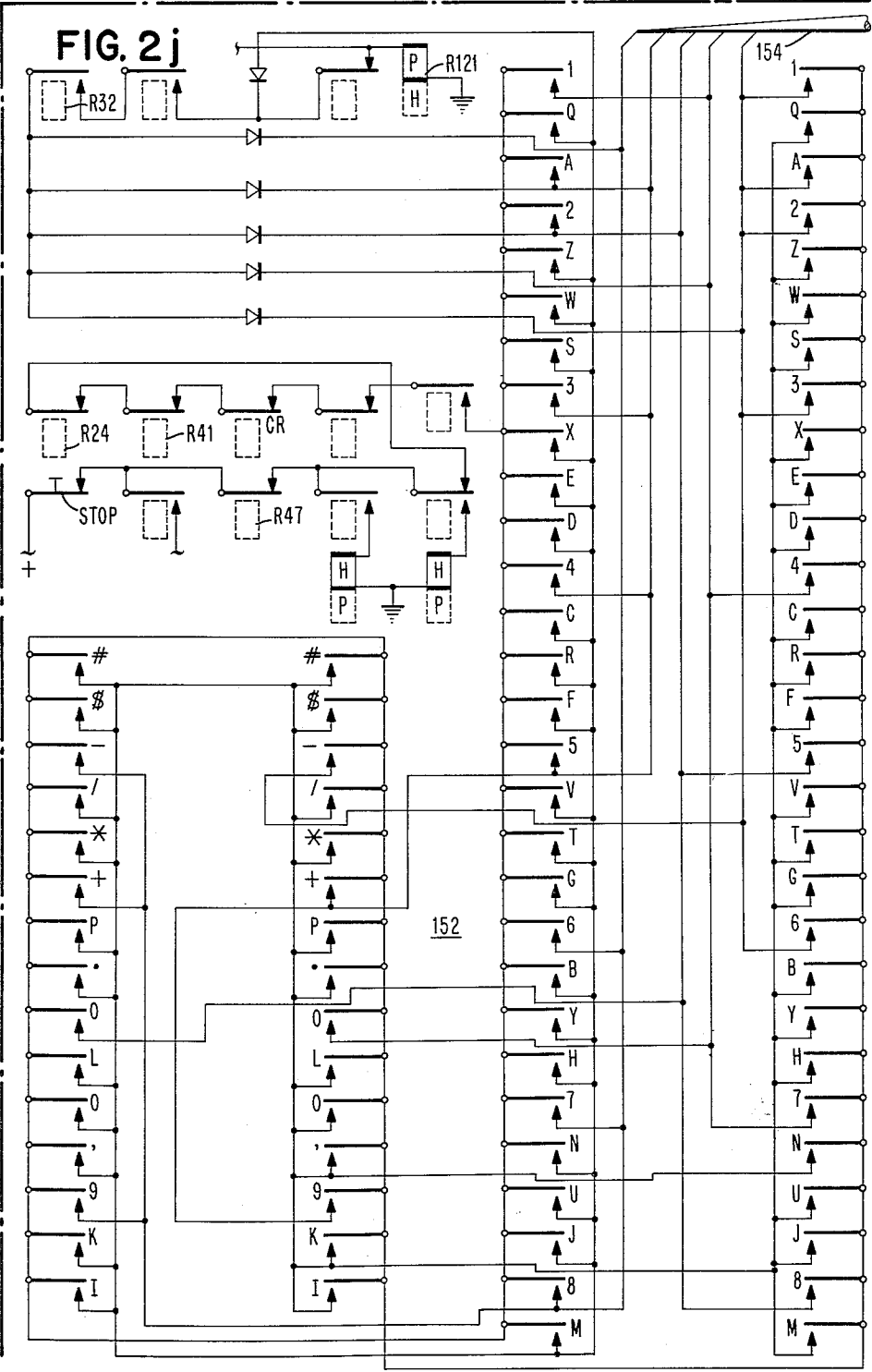
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CONSOLE TYPEWRITER BIT PRINTING

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CONSOLE TYPEWRITER BIT PRINTING

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6 Claims. (Cl. 197-19)

This invention relates generally to typewriters, and it has reference in particular to controls for a typewriter console for a computer or the like.

More specifically, the purpose of the invention is to provide for simplifying the finding of an error in information being typed by a console typewriter used with a computer.

It is one object of this invention to provide that whenever any character to be typed by a typewriter has more or less than the correct number of bits, the bits themselves will be type so that the nature of the error may be determined.

Another object of the invention is to provide in the event that a character to be typed has the wrong number of bits therein for typing the actual bits together with an appropriate zone or numeric designation.

Yet another object of this invention is to provide in a system wherein a typewriter is operated by coded bit signals for typing the bits of a character having other than the correct number of bits and changing the color of the typing in order to readily locate the error.

It is also an important object of this invention to provide in a console typewriter for automatically typing an error designation preceding a faulty character and then following this designation by the individual bits.

The foregoing and other objects, features and advantages of the invention will be apparent from the following more particular description of a preferred embodiment of the invention, as illustrated in the accompanying drawings.

In the drawings:

FIG. 1 is a block flow diagram illustrating the relationship of the typewriter and the controls to the computer system.

FIGS. 2a through 2j, arranged with FIGS. 2a through 2e side by side above FIGS. 2f through 2j, together provide a schematic diagram of the typewriter and console controls necessary for practicing the invention in one of its forms.

FIG. 3 is a block diagram showing the arrangement of FIGS. 2a through 2j.

Referring particularly to FIG. 1, it will be seen that a typewriter TW is used in conjunction with keyboard control KC and an operator's control panel OCP for operating through console controls CC for typing information out of a computer system from an arithmetic register AR or the like via storage means such as an arithmetic word buffer AWB and a drum DR, as well as for typing information into means such as an address register ASR or address analysis unit AA of the system.

The typewriter TW, which may be of a well-known type, as shown in FIGS. 2a through 2j, is provided with the usual plurality of keys for typing alphabetic, numeric, and special characters, these keys being operated by type magnets generally designated by the numeral 150 and bearing the respective alphabetic, numeric, and special character designations. The keys are further provided with a plurality of contacts, designated generally by the numeral 152 and designated individually by the characters or numerals with which they are associated for transmitting signals to the computer system via a cable 154.

In order to read bit information into the typewriter TW from the buffer AWB or the drum DR, a plurality of zone bit relays R61 through R65 and numeric bit relays R81 through R85 are provided which are operated in re-

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sponse to incoming bit signals to their respective latches L. The bit signals arrive from the system over bit lines "0," "1," "2," "3," and "6" where they are gated with suitable alphabetic and numeric gating signals over lines Alpha and Numeric W+D from a console timing ring and a drum or other storage device timing signals to AND circuits A. The bit signals are then mixed in OR mixes O with suitable Space and Store signals for operating their respective latches L through suitable drivers D. A plurality of zone repeater relays R69, R71, R72, R74, and R75 are used in conjunction with the zone bit relays, and a plurality of numeric repeater relays R86, R89, R92, R95, and R98 are used in conjunction with the numeric bit relays for normally controlling the energization of the alphabetic, numeric, and special character type magnets 150.

In order to provide for printing the individual bits instead of the character whenever there are more or less than the prescribed number of bits for a character, which in the present instance may be set as two bits for each numeric character, and two zone bits and two numeric bits for each alphabetic and special character, a character select delay check relay R101 is provided for operating in conjunction with a character select noncheck relay R103 and a character select check relay R102 under the control of contacts of the repeater relays. In order to further make an error in the number of bits more evident, provision is made for energizing the asterisk magnet 155 and a color detent relay R26 to effect operation of the color detent magnet 156 to shift the ribbon from black to red so as to type the asterisk * and the bits in red. A color control transfer relay R27 is provided for operating a transfer magnet 158 and changing the ribbon from red back to black at the end of the operation. A carriage return back signal relay R47 is operated by carriage return contact CR-1. A character select delay relay R48 having a timed drop-out time is utilized for timing purposes in conjunction with a back signal relay R36 operating the relay R103 to indicate that no character has been typed within the predetermined time allowed for typing of a character. A line end relay R29 provides an automatic carriage return signal, and a bit print relay R29 sets up a circuit for the printing of bits when there is other than a correct number of bits in a character. A plurality of advance relays R59, R58, R56, R55, R53, R52, and R49 are provided in conjunction with different ones of the bit relays for advancing the bit printing cycle to successively analyze the "6," "3," "2," "1," "0," "Z," and "D" bits for bit printing. The alpha relay R24 is utilized for indicating and printing of bits during an alphabetic operation. The end of a bit print or a normal operation is indicated by means of an end of print relay R35. A SCC relay R32 is picked by the selector common contact SCC-1 of the typewriter which closes during each typing cycle for a portion of the cycle. The carriage return back signal relay R47 is picked by the carriage return contact CR-1 on the typewriter carriage at the end of the carriage travel, while the back signal relay R36 provides a signal for advancing the console rings, this signal being suppressed during bit print operation so as to prevent advancing of the rings on each typing operation since each typing operation involves the typing of a bit and not a character. A bit print start relay R80 is provided for controlling the bit print relay R29 in response to operation of the character select noncheck relay R103.

The bit print feature of the console typewriter TW enables the operator to determine which character bits were missing or what bits were present when the character was transferred from the drum to the typewriter. The bit print feature works equally well for both alphabetic and numeric characters. In either case, the bits that were present during the transfer are typed. A red asterisk is typed first, designating an error condition and

enabling start of bit printing; then the zone bits, of the character is alphabetic, are typed, followed by the automatic typing of a letter Z to identify the previously-typed bits as zone bits. The numeric bits are typed next, followed by the automatic typing of a letter D to identify the previously-typed bits as numeric or digit bits.

Alphabetic bit printing

Every alphabetic character is made up of two numeric numbers, each of which is represented by two bits of a 2-out-of-5 bit code. The zone portion of the character sends zone bits over the bit lines of FIG. 2a in conjunction with Alpha W+D signals to the associated console zone bit relay R61 through R65. In the same manner the numeric portion of the character sends numeric bits over the numeric bit lines with Numeric W+D signals to the associated console numeric bit relays R81 through R85. Therefore, since in the code under consideration an alphabetic character, such as for example A, is represented by the "6" and "0" zone bits and the "1" and "0" numeric bits, two zone bit relays and two numeric bit relays should be picked for each alphabetic character to be typed.

The character select noncheck relay R103 is connected to a network of zone bit repeater relay contacts and numeric bit repeater bit relay contacts so that it will be picked whenever there are (1) more or less than two zone bit repeater relays picked or (2) more or less than two numeric bit repeater relays picked.

If, for example, the "1" numeric bit is missing in the character A, two zone bit relays R65, R61 and one numeric bit relay R81 are picked, signifying a missing numeric bit. The bit relays R65, R61, and R81 pick the associated bit repeater relays R75, R69, and R86 through armatures R61-1, R65-1, and R81-1 n/o. In the case of an alphabetic character, if any one zone bit repeater picks, an obvious circuit will be provided to pick the alpha relay R24, and in the present instance through armatures R65-2 and R61-2 n/o. The circuit to the character select delay relay R101 is interrupted if any one bit repeater relay picks as at armature R86-1 n/c. With relay R101 down, either relay R102 or R103 can now be picked. The character select check relay R102 signifies a correct operation, so in this case the character select noncheck relay R103 is picked through armatures R101-1 n/c, R86-1 n/o, R92-1 n/c, R98-1 n/c, R89-1 n/c, and R95-1 n/c.

A circuit is provided through armature R103-1 n/o of the character select noncheck relay R103 to pick the asterisk magnet 155 and through armature R103-2 n/o to energize the color detent relay R26, which causes the ribbon to shift from black to red in time for the asterisk to be typed in red.

During the asterisk typing cycle, the selector common contact SCC-1 closes and picks its associated relay R32. A circuit is thereby provided through armature R32-1 n/o of relay R32 and armature R103-4 n/o, armature R17-1 n/c of the stop relay R17 and armature R29-2 n/c of the bit print relay R29 to energize the bit print start relay R80. Relay R80 picks and through armature R80-1 n/c provides an obvious energizing circuit for the bit print relay R29. Transfer armature R29-1 n/c of the bit print relay R29 interrupts the circuit to the asterisk magnet 155.

Typing zone bits

When the SCC-1 contact opens during the asterisk typing cycle, relay R32 is de-energized, and the transfer armature R32-1 n/o interrupts the previous energizing circuit for the bit print start relay R80. With relay R80 dropped, a circuit is provided over line 166 to the "6" print magnet through armature R29-3 n/o of the bit print relay R29, armature R80-2 n/c of the bit print start relay R80, armature R65-3 n/c of the "6" bit zone relay R65, armature R32-2 n/c of the relay R32, and armature R29-3 n/o of the bit print relay R29 to the "6" type magnet. During the "6" typing cycle, contact SCC-1

closes and picks its associated relay R32. A circuit is thereby provided for the advance "6" relay R59 through armature R29-8 n/o of the bit print relay R29, armature R80-2 n/c of the bit print start relay R80, armature R65-3 n/o of the "6" zone bit relay R65, and armature R32-2 n/o of the relay R32 to the advance "6" relay coil 59. Relay R59 opens the circuit to the hold coil 65H of the "6" bit relay R65 at armature R59-1 n/c, and the relay R65 is de-energized, in turn de-energizing its associated bit repeater relay R75 at armature R65-1 n/o.

When the SCC-1 contact opens during the "6" typing cycle, relay R32 drops, breaking the circuit to relay R59 at armature A32-2 n/o so as to provide at armature R59-2 n/c of relay R59 a circuit through armature R64-1 n/c, armature R58-1 n/c, armature R63-1 n/c, armature R56-1 n/c, armature R62-1 n/c, armature R55-1 n/c, armature R61-3 n/o of the "0" zone bit relay R61, armature R32-3 n/c of relay R32, armature R29-4 n/o of the bit print relay R29 and line 168 to energize the "0" type magnet. During the "0" typing cycle, the SCC-1 contact closes and picks relay R32 so as to provide a circuit through armature R32-3 n/o to the advance "0" relay R53. Relay R53 opens the circuit to the hold coil 61H of relay R61 at armature R53-1 n/c so that R61 drops and drops the associated bit repeater relay R69 by opening its circuit at armature R61-1 n/o.

Type letter Z

When the SCC-1 contact opens during the "0" typing cycle, relay R32 drops. With relay R32 down, the circuit to relay R53 is broken at armature R32-3 n/o and a circuit is provided through armature R53-2 n/c and armature R24-1 n/o of the alpha relay R24 to energize the Z type magnet through armature R32-4 n/c, armature R29-5 n/o, and armature R49-1 n/c of the advance D relay R49. During the Z typing cycle, the SCC-1 contact closes and picks relay R32. Relay R32 combines with relays R24 and R29 to pick the advance Z relay R52 through armature R32-4 n/o and armature R24-1 n/o. Operation of relay D52 interrupts the energizing circuit for the alpha relay R24 at armature R52-1 n/c.

Type numeric bits

When the SCC-1 contact opens during the Z typing cycle, relay R32 is de-energized, and the circuit to relay R52 is broken at armature R32-4 n/o. A circuit is thereupon provided through armature R52-2 n/c, armature R24-2 n/c, and armature R29-6 n/o to energize the advance D relay R49. A circuit is now provided through armature R49-1 n/o of the advance D relay, armature R85-1 n/c, armature R59-3 n/c, armature R84-1 n/c, armature R58-1 n/c, armature R83-1 n/c, armature R56-1 n/c, armature R82-1 n/c, armature R55-1 n/c, armature R81-1 n/o, armature R32-3 n/c, armature R29-4 n/o and line 168 to energize the "0" type magnet. During the "0" typing cycle, SCC-1 contact closes and picks relay R32. Relay R32 combines with relays R29 and R81 to pick the advance "0" relay R53 through armature R32-3 n/o. Relay R53 opens the circuit to the hold winding of 81H of the relay R81 at armature R53-2 n/c and relay R81 drops its associated bit repeater relay R86 by opening the circuit at armature R81-1 n/o.

Type letter D

When the SCC-1 contact opens during the "0" typing cycle, relay R32 drops out and opens the circuit to relay R53 at armature R32-3 n/o. A circuit is thereby provided for the D print magnet extending through armature R49-1 n/o, armature R29-5 n/o, armature R32-4 n/c, armature R103-5 n/o, and armature R53-3 n/c and the circuit extending through armature R29-3 n/o.

End operation

During the D typing cycle, the SCC-1 contact closes

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and picks relay R32. Relay R32 combines with relays R29 and R103 to pick the advance Z relay R52 through armature R32-4n/o and armature R103-5n/o. Relay R52 then combines with the relays R49, R29, and R103 to pick the end of print relay R35 through armature R49-2n/o, armature R52-3n/o, armature R103-5n/o, and through the chain of contacts including armature R29-3n/o. Relay R35 drops the bit print relay R29, opening the circuit at armature R35-1n/c, and picks the back signal relay R36 through armature R20-1n/c, armature R35-2n/o and armature R32-1n/o. It also combines with relays R26 and R32 to pick the color transfer relay R27 through armature R26-1n/o, armature R35-3n/o, and armature R32-6n/o. A circuit is provided at armature R27-1n/o to energize the color control transfer magnet 158 which shifts the ribbon from red back to black.

When the SCC-1 contact opens during the D typing cycle, relay R32 drops. With relay R32 down, the circuits to relays R52, R35, and R36 are broken at armature R32-4n/o, armature R52-3n/o and armature R35-2n/o. The circuit to relay R49 is interrupted at armature R35-1n/o of relay R35. The dropping of relay R36 interrupts the circuit to relay R26 at armature R36-1n/o, which de-energizes the color control detent magnet 156 at armature R26-1n/o. A signal is sent to electronic equipment of the system through armature R36-3n/c so that the next character can now be typed in the usual manner.

If all the bits are missing, the asterisk is still typed in response to operation of relays R103, R80, and R29 followed by the character D. The character is not typed in this operation. The presence of extra zone or numeric bits still causes the pickup of the character select non-check relay R103 in the usual manner. All the bits including the extra bits are typed. The transferred zone bits are typed first in the following order "6," "3," "2," "1," and "0," the advance relays operating in the manner previously described so that any bits not transferred cause the circuitry to bypass that area and act on the next bit that was transferred. Typing of the asterisk, Z and D and ending the operation occur exactly as previously described.

Numeric bit print

During the typing of the numeric character, there should be two bit relays and two bit repeater relays picked. The character select noncheck relay R103 picks whenever there are more or less than two numeric bit relays picked. With relay R103 picked, the red asterisk is typed exactly as described for an alphabetic bit print. During the asterisk typing cycle, the bit print start relay R80 and the bit print relay R29 are picked. As soon as relay R29 picks the advance D relay R49 also picks through armature R29-6n/o. Relay R49 combines with relay R29 and a bit relay to energize the print magnet for the following typing cycle. The typing of the D and the end of the operation occur exactly as described in the alphabetic bit print. Extra bits are typed as previously described, the typing of the extra bits being preceded by an asterisk and followed by the character D. If all the bits are missing, the asterisk is still typed, followed by the typing of the character D.

Relay R48 is de-energized during each typing cycle at armature R41-1 of relay R41 which responds to a signal to type from the system. If relay R36 operates in a normal cycle, relay R48 is held through armature R36-2n/o. If no back signal is received, a circuit is provided through R32-5n/c, R48-1n/c, and R102-1n/o to pick the # magnet 160 to indicate a proper number of bits but no character available for the code.

In a normal print operation for an A, zone bit relays R65, R61, and numeric bit relays R82, R81 are picked, completing obvious circuits for the related bit repeater relays R75, R69, and R89, R86, respectively. Alpha relay R24 is picked through R65-2n/o and R61-2n/o.

Character select delay relay R101 is dropped by arma-

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ture R86-1n/c and relay R102 is picked through R101-2n/c, R29-7n/c, R69-1n/o, R75-1n/o, R71-1n/c, R72-1n/c, R74-1n/c, R24-3n/o, R86-2n/o, R92-2n/c, R98-2n/c, R89-2n/o, and R95-2n/c.

A circuit is thereby provided through R32-6n/c, R102-2n/o, R24-4n/o, R75-2n/o, R74-2n/c, R72-2n/c, R71-2n/c, R89-3n/o, R98-3n/o, R95-3n/c, and R86-3n/o to the A type magnet. During typing SCC-1 closes, picking relay R32. Back signal relay R36 picks through R32-1n/o, R103-4n/c, and R20-1n/c and operates to turn on a back signal latch (not shown) in the console electronic equipment through armature R36-4n/o.

When SCC-1 opens, relay R32 drops, and the circuit to relay R36 is broken at R32-1n/o. The circuit is now ready for the next character, the bit relays being dropped when the latches L are reset by a suitable reset signal over line 165.

From the above description and the accompanying drawing it will be apparent that an error and the nature thereof may be easily detected since the actual bits received are typed in red and indicated by an asterisk. This facilitates in not only detecting the error but determining the nature thereof so that the cause may be remedied.

While the invention has been particularly shown and described with reference to a preferred embodiment thereof, it will be understood by those skilled in the art that various changes in form and details may be made therein without departing from the spirit and scope of the invention.

What is claimed is:

1. The combination with a typewriter having a plurality of keys for typing characters and having operating magnets therefor, of input means including a plurality of bit means selectively operable in different combinations to effect operation of particular ones of said magnets in response to a bit code having different combinations of a prescribed number of bits for each character, check means controlled by said bit means in response to other than the prescribed number of bits in any character, and means controlled by the check means for effecting operation of the magnets to print the actual bits.

2. In combination, a typewriter having a plurality of keys and magnets for actuating said keys to print characters including numeric characters, input means for said typewriter including a plurality of bit relays selectively operable in different combinations in response to a predetermined bit code for operating different ones of said magnets to print their respective characters, check means including contacts of said bit relays for determining other than a prescribed number of bits for a character, and means controlled by the check means for connecting the input means to different ones of said magnets for printing the actual bit content of the character.

3. In combination with a typewriter having a plurality of keys for typing numeric and alphabetic characters and having magnets for operating said keys, a plurality of numeric and zone bit relays operated by incoming numeric and zone bit signals, circuit means controlled by said bit relays connected to selectively operate said magnets to type characters in response to predetermined bit code signals, check means operated by other than a predetermined number of bit signals for zone or numeric portions of a signal, circuit means controlled by the check means for operating a particular one of the magnets to indicate an error, and additional circuit means controlled by the check means for changing the connections of the magnets to type the individual bits corresponding to the bit signals.

4. In a typewriter console, a typewriter having a plurality of keys for typing alphabetic and numeric characters and having magnets individual to each key for operating said keys, input means including a plurality of bit devices connected to respond to incoming bit signals, circuit means controlled by the bit devices to selectively connect different ones of the magnets for operation in response

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to different combinations of predetermined numbers of bit signals, character check means controlled by said bit devices operable in response to other than a predetermined number of bits for a particular character, means controlled by the character check means to effect operation of a predetermined magnet to type a character designating an error, other means controlled by the check means for changing the type color from an initial value, and circuit means controlled by the check means to change the connections of the magnets to type the actual bits for the particular character.

5. In combination, a typewriter having a plurality of keys with magnets for operating them to type characters, means including a plurality of bit relays normally connected to selectively control the magnets in response to different combinations of bit code signals, character check means operable under the control of the bit relays in response to more or less than a predetermined number of bit relays operated, means controlled by the check means and the bit relays for changing the connections of the magnets to type the actual bits for a particular character having more or less than a predetermined number

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of bits, and means controlled by the check means for operating a selected one of the magnets to designate the kind of bits.

6. The combination with a typewriter having a plurality of keys for typing characters and having operating magnets therefor, of input means selectively responsive to input bit signals for effecting connection of a predetermined one of said magnets in response to a valid code of bits, check means controlled by said input means for detecting other than valid code signals, means controlled by the check means for changing the connections of the magnets to print the actual bit signals, and other means controlled by the check means for indicating an error condition.

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