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SIGNAL PRODUCING APPARATUS

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Fig-1

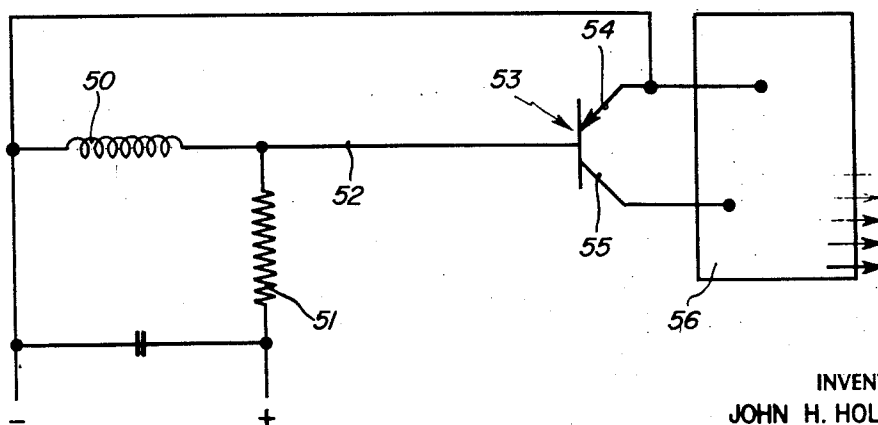
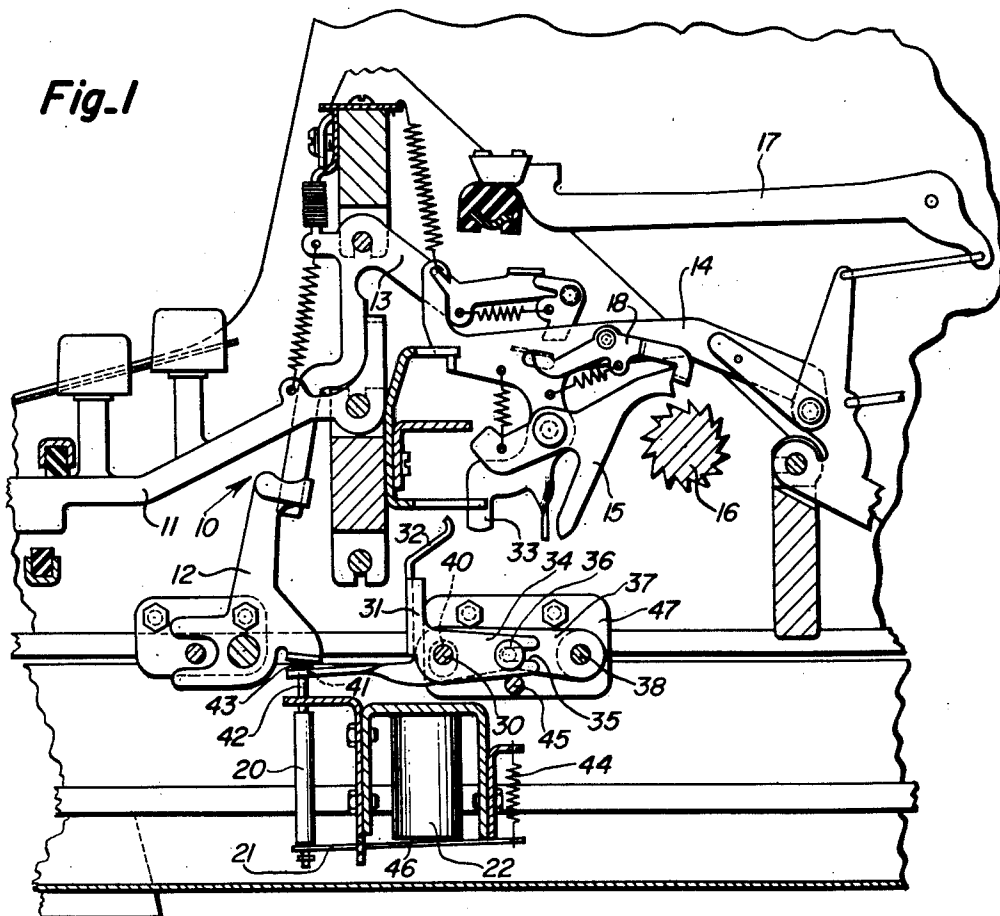


Fig-2

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1

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SIGNAL PRODUCING APPARATUS

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This invention relates to a novel type signal producing apparatus and more particularly relates to a switchless means for selectively initiating a plurality of output signals.

In certain types of business machines it is often desired to initiate an electrical output signal in response to the mechanical actuation of each of several structural elements of the machine. An illustrative example is where electrical signals are to be initiated by the respective operation of the various control linkages of a typewriter. Conventionally a plurality of switches are used here, each of these switches being mechanically operated by the actuation of the associated control linkage of the typewriter. Such switching means have not been entirely satisfactory in that after extended repetitive use they may structurally and/or operationally fail by reason of wear and/or poor contact characteristics respectively.

One object of the instant invention is to provide an improved switchless apparatus for selectively initiating a plurality of electrical signals.

Another object of the invention is to provide a plurality of switchless signal producing means which are associated with the respective control linkages of a typewriter whereby movement of any one of said linkages serves to change the flux in an associated electromagnetic circuit so as to correspondingly change the voltage in the related electrical circuit; thus initiating a signal corresponding to the control linkage operated.

Another object of the invention is to provide a plurality of individual switchless electrical signal producing means for the control linkages of a typewriter, each of said means including a solenoid having an armature which is adapted to operate, and to be operated by, the associated key control linkage.

Another object of the invention is to provide a novel signal producing apparatus whereby a change in the reluctance of a magnetic circuit is used to produce a corresponding change in the voltage level of a normally biased electrical circuit associated with said magnetic circuit.

Another object of the invention is to provide a novel switchless means for initiating an electrical signal in response to the varying of the air gap in a magnetic circuit.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings in which like reference numerals designate like parts throughout the figures thereof and wherein:

Figure 1 is a vertical side elevational view taken in partial section and shows the apparatus associated with one type action of the machine.

Figure 2 illustrates one circuit diagram possible for the instant device.

The instant invention is shown and will be described in connection with an electric typewriter of the type presently being produced and marketed by the Royal McBee Corporation. It will be understood, however, that the instant signal producing means may be adapted for use not only in other types of typewriters but also in various other types of business machines such as record punches.

2

Figure 1 illustrates the construction and operation of one of the normal complement of control linkages of the typewriter, together with its associated electrical signal producing means. In that each of the linkages and its related signal producing means are similar a detailed description of only one thereof will suffice here. Unless otherwise indicated it will be understood that the various parts of the apparatus shown are suitably mounted on the machine frame.

Each control linkage 10 comprises a key lever 11 and a lever 12 either of which is adapted to rotatably actuate the bell crank 13, which is operative to actuate the trip pawl latch 18 mounted on the action plate 14. A trip pawl 15, also mounted on the action plate, is adapted when released by said latch to move into operative engagement with the power roll 16 so as to cause action plate 14 to be thrown to the left, as seen in Figure 1, and impart a printing stroke to the associated type bar 17 of the machine. The lever 12 is rotatably operated in a counter clockwise direction by means of the vertically movable power operated actuator rod 20. Rod 20 is articulately connected to the free end of the pivoted armature 21 of the solenoid 22. As will be evident the printing stroke of the type bar may be initiated by either manually operating the key lever 11 or by energizing the solenoid 22. The construction and operation of the above-described apparatus is known and if further details thereof are desired reference may be made to copending application Serial No. 780,090, filed December 12, 1958, for Data Processing System.

Rotatably mounted on a cross shaft 30 is a bell crank 31 having an upwardly extending arm 32 that lies in the operative path of travel of the depending portion 33 of the action plate 14. The rearwardly extending arm 34 of the bell crank is provided with an open ended slot 35 in which is disposed a stud 36 that is secured to the lever 37. Lever 37 is rotatably mounted on a cross shaft 38 and is provided with a slot 40 through which the shaft 30 extends, such permitting a predetermined amount of rotative movement of said lever 37. The outer or forward end of lever 37 is slotted as at 41 so as to receive the reduced portion 42 of said rod 20. A flange 43 formed on said rod limits the downward movement of the latter relative to lever 37. The spring 44 normally biases the solenoid armature 21 in a counter clockwise direction thereby, through the linkage just described, also biasing the bell crank 31 in a clockwise direction to a normal position determined by engagement of the lower edge of said rearwardly extending bell crank arm 34 with the cross shaft 45. In this position of the bell crank 31 there exists a predetermined air gap 46 in the magnetic circuit of the solenoid 22. The shafts 30, 38, and 45 are suitably mounted on side brackets such as 47, which are secured to the machine frame.

It will be apparent that when the above described control linkage 10 is operated by key lever 11 or lever 12 the said forward or leftward movement of the depending portion 33 of the action plate will rotate bell crank 31 in a counter clockwise direction thereby pivotally displacing the lever 37 so as to elevate rod 20 and decrease the said air gap 46. This action will cause an increase in the flux in the magnetic circuit of solenoid 22 and will thereby induce or generate an electrical pulse for controlling the operation of a voltage sensitive transistor circuit as will be further described below. Restoration of the action plate to its normal position will permit spring 44 to restore the solenoid armature 21 and its related linkage to normal position.

Figure 2 shows an illustrative circuit diagram for the instant apparatus. Here the windings 50 of solenoid 22 are connected across a voltage source through resistor 51 as shown. The base 52 of a transistor 53 is connected

between windings 50 and resistor 51 while the transistor emitter 54 and collector 55 are connected to an encoder 56 in the usual manner. The said voltage source normally biases the solenoid windings so that a magnetic circuit is set up across the said air gap 46. Here in that the transistor is of the "PNP" type the same will not normally conduct as the base 52 is positive relative to the emitter. When the typewriter is operated and the air gap 46 closed as above described the resultant decrease in the reluctance of the magnetic circuit and the accompanying increase in magnetic flux in the solenoid will induce or generate a voltage in said windings 50 which makes the base of transistor 53 negative with respect to the emitter 54. Under these conditions the transistor will conduct and the resultant output signal which is initiated in the transistor circuit and which corresponds to the typed character will be encoded by the encoder 56 for use with various auxiliary data processing equipment.

It will be evident that as each successively actuated type bar partakes of its printing stroke a corresponding output signal will be initiated in the associated transistor circuit. In such an arrangement no electrical switches as such are required and hence the problems of wear, improper contact, mechanical failure, etc., encountered in the use of conventional switches are obviated in a simple and relatively inexpensive manner.

While there is in this application specifically described one form which the invention may assume in practice, it will be understood that this form of the same is shown for purposes of illustration only and that the invention may be modified and embodied in various other forms without departing from its spirit or the scope of the appended claims.

The invention claimed is:

1. A switchless apparatus for initiating an electrical signal in response to the actuation of a typewriter control linkage; comprising a normally biased magnetic means having a movable armature which varies the air gap of the associated magnetic circuit, a signal output circuit electrically connected to said magnetic means, and means operatively connecting said linkage to said armature for varying said air gap whereby operation of said control linkage changes the magnetic flux density in said magnetic circuit to thereby operate said output circuit.

2. In a typewriter having a plurality of control linkages, a plurality of solenoids respectively associated with said linkages, means for normally electrically biasing said solenoids, a plurality of electrical signal producing circuits respectively electrically connected to said solenoids, and means respectively operated by said control linkages for varying the reluctance of the magnetic circuits of said solenoids whereby selective movement of said linkages varies the magnetic flux in the respectively associated solenoids thereby inducing voltages therein which respectively operate said signal producing circuits.

3. In a typewriter having a power roll, an action plate adapted to be actuated by said power roll, control means operable to couple said action plate and said power roll so as to operate one of the type bars of the machine, and a solenoid having an armature adapted to operate said control means; the improvement comprising means for normally electrically biasing said solenoid so as to establish a predetermined flux density in the magnetic circuit of said solenoid, means operated by said action plate for decreasing the air gap in said magnetic circuit, and a voltage sensitive circuit electrically connected to and controlled by the solenoid windings such that when said air gap is reduced by movement of said action plate a voltage is induced in said windings which operates said voltage sensitive circuit thereby initiating an electrical output signal which corresponds to the character typed during the operation of said action plate.

4. Apparatus as defined by claim 3 additionally comprising means for encoding said output signal.

5. In a keyboard control for typewriters and the like, a plurality of selectively operable means for respectively controlling the typing of a plurality of individual characters, and a plurality of individual switchless signal initiating means respectively operable in response to the operation of said selectively operable means; each of said signal initiating means comprising a solenoid having an armature that is adapted to be operated by a related one of said selectively operable means, said armature when moved serving to vary an air gap in the magnetic circuit of said solenoid, means normally electrically biasing the windings of said solenoid so as to establish a predetermined normal flux in the magnetic circuit of said solenoid, and an electrical circuit adapted to initiate an output signal, said electrical circuit being operable in response to voltage changes in said solenoid windings such that when said armature is operated by said one of said selectively operable means the resultant change in the said air gap and the flux in said magnetic circuit will induce a voltage in said solenoid windings which operates said electrical circuit so as to thereby initiate an electrical output signal which corresponds to the character to be typed.

6. In a keyboard control for typewriters and the like, a plurality of selectively operable control elements for respectively controlling the typing of a plurality of individual characters, and a plurality of means for initiating individual electrical signals in response to the respective actuation of said selectively operable control elements; each of said means comprising a solenoid having an armature that is adapted to be operated by one of said control elements, said armature when moved serving to vary the reluctance of the magnetic circuit of said solenoid, circuit means normally electrically biasing the windings of said solenoid so as to establish a predetermined normal flux in the magnetic circuit of said solenoid, and a voltage sensitive circuit adapted to initiate an electrical output signal, said voltage sensitive circuit being electrically controlled by the voltage in said solenoid windings such that when said one of said control elements is actuated the resultant movement of the solenoid armature will vary the reluctance and the flux in said magnetic circuit which in turn will induce a voltage in said solenoid windings which operates said voltage sensitive circuit thereby initiating an electrical output signal which corresponds to the said one of said control elements.

7. In a keyboard control means for typewriters and the like, a plurality of control elements, and a switchless apparatus for initiating electrical output signals in response to the selective actuation of said control elements of said keyboard control means; said switchless apparatus having a plurality of signal producing means respectively associated with said control elements, each of said signal producing means comprising an electromagnetic means having an armature, means for normally electrically energizing said electromagnetic means so as to establish a predetermined flux in the magnetic circuit of said electromagnetic means, an electrical circuit adapted to initiate an output signal, said electrical circuit being operable in response to voltage changes in said electromagnetic means, and means connecting said armature with the related keyboard control element so that when said element is actuated the resultant change in position of said armature changes the flux in said magnetic circuit which in turn induces a voltage in said electromagnetic means which operates said electrical circuit so as to initiate an output signal that corresponds to the keyboard control element actuated.

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