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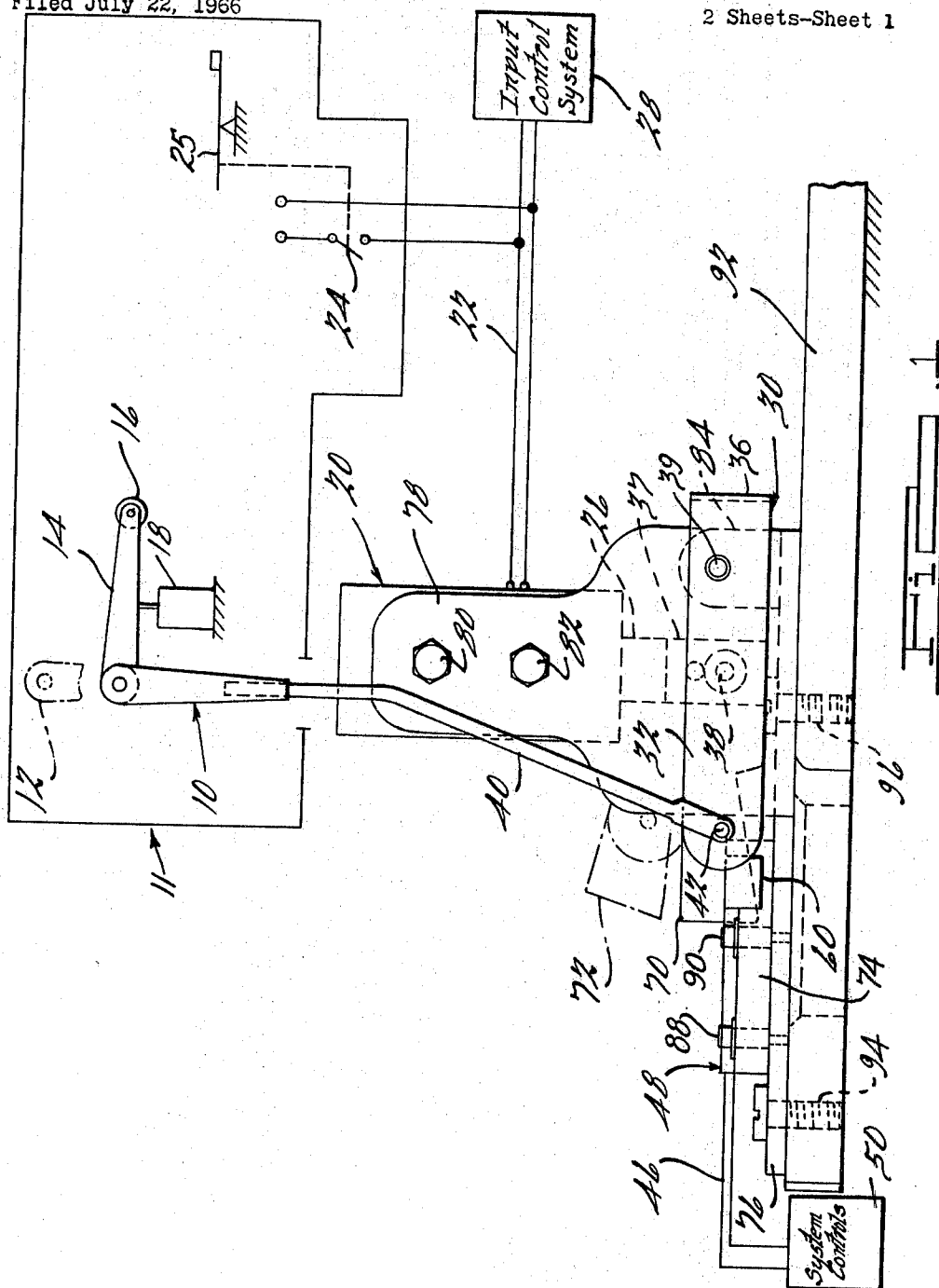
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3,493,092

TABULATION INDEX CONTROL MEANS FOR PRINTER

Filed July 22, 1966

2 Sheets-Sheet 1



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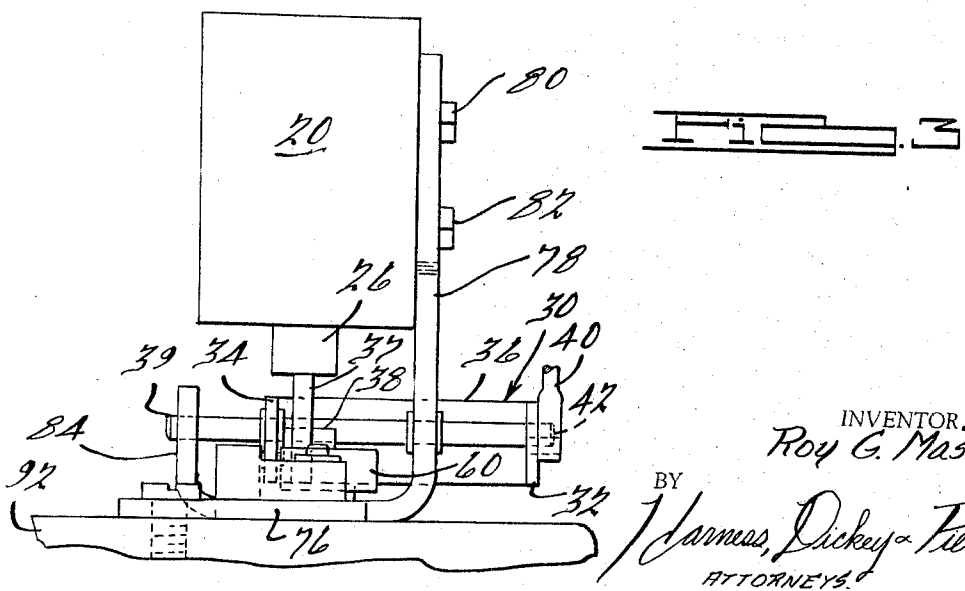
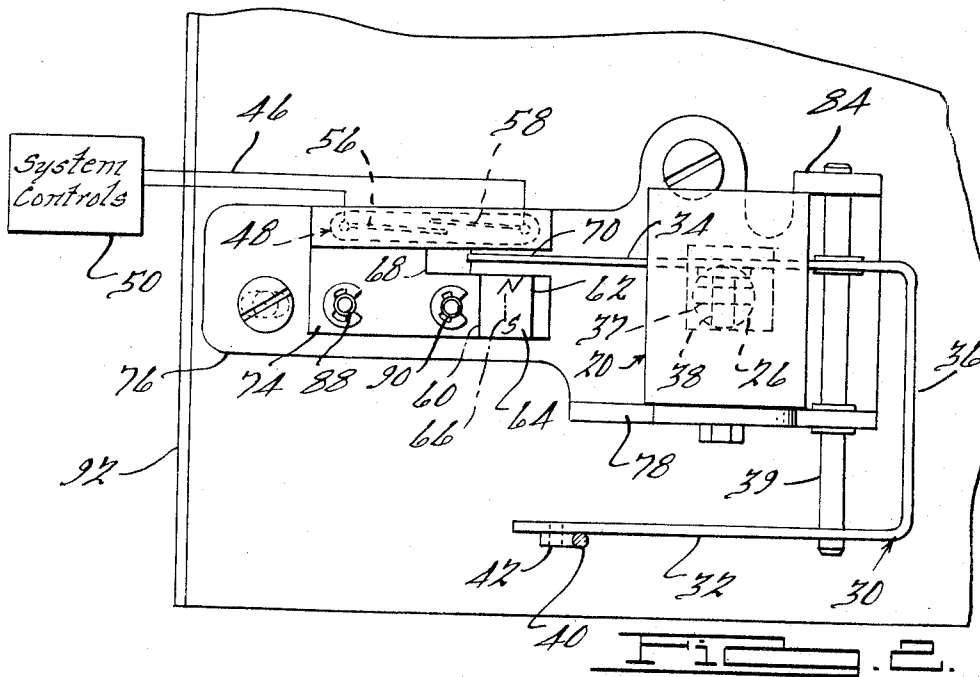
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2 Sheets-Sheet 2



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3,493,092

TABULATION INDEX CONTROL MEANS FOR PRINTER

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10 Claims

ABSTRACT OF THE DISCLOSURE

A tabulation index control means having a solenoid connected to tabulation control linkage of a printer by connecting linkage which acts as a shield between a magnet and magnetically operable contact members of a system control circuit so that movement of the tabulation control linkage provides an output signal coterminus with the tabulation operation. The solenoid is energizable by an input signal derived from tabulation key lever movement in the printer or by an input signal derived from a data storage device.

This invention relates to a new and improved tabulation index control means for a printer or the like having selectively operable tabulation apparatus by which a carriage or carrier in the printer may be selectively moved between spaced positions.

More particularly, this invention relates to new and improved tabulation index control means for use with a printer of the type manufactured by International Business Machines, known as the Selectric typewriter, and having a type sphere mounted on a carriage and a fixed platen rather than a plurality of type bars operable at a fixed printing location and a movable platen. A portion of the operating mechanism of such a printer is shown in U.S. Patent No. 3,239,049, for example. Printers of this type have previously been incorporated in an automatic writing system of the type disclosed in U.S. Patents No. 3,353,744; No. 3,380,569; and No. 3,435,419. In such a system, the printer is manually operable by manual selection of key levers on a keyboard in a conventional manner in a manual mode of operation and is automatically operable by input signals sent to electrically operable control apparatus from an associated tape reader or the like in an automatic mode of operation.

One of the problems with such apparatus in the past has been the necessity to correlate the manually operable actuation mechanism and the electrically operable actuation mechanism so as to obtain the desired results in both manual and automatic modes of operation. Thus, while the automatic mode of operation was capable of being completed at a much faster rate than the manual mode of operation, the speed of operation in the automatic mode of operation was limited by manual operation considerations. In the present invention, means have been provided to greatly increase the speed of operation of an automatic writing system in connection with tabulation operations occurring in the system printer.

One of the objects and one of the advantages of the present invention resides in the reduction of control system time delay necessary to effect a tabulation operation by effectuation of tabulation operations solely by electro-mechanical means responsive to electrical input signals derived either manually by closing of a key lever operated switch or automatically from a data storage device.

Another object and another one of the advantages of the present invention resides in the reduction of control system time delay necessary to complete a printer tabulation operation by providing an output signal coterminus with the length of time of tabulation operation.

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The inventive principles have been illustratively embodied in an automatic writing system of the type heretofore described as shown in the accompanying drawing wherein:

FIGURE 1 is a side elevational view, partly schematic, of the illustrative embodiment of the invention;

FIG. 2 is a plan view of a portion of the apparatus shown in FIG. 1; and

FIG. 3 is an end view of a portion of the apparatus shown in FIG. 1.

Referring now to FIG. 1, the illustrative embodiment is shown to comprise a tabulation operation control link means 10 which is of conventional design as found in a printer 11 such as the Selectric typewriter. In both the manual mode of operation and in the automatic mode of operation the control link means 10 is movable upwardly and downwardly between a tabulation disabling position, as shown by the solid lines, and a tabulation enabling position as indicated at 12 by the broken lines. The upper end of the link means 10 is connected by additional control linkage 14 in the Selectric typewriter to tabulation operation mechanism comprising a tab torque bar and illustrated schematically at 16.

Holding and restore means 18 of conventional design, as manufactured by International Business Machines, are associated with the control linkage 14 in the illustrative embodiment to hold the control linkage 14 in the enabling position after actuation thereto by control link means 10 until the end of a tabulation operation in the printer at which time the holding and restore means 18 is effective to return the control linkage 14 to the disabling position. In the Selectric typewriter, the holding and restore means comprises a torque bar lockout tab which is released at the completion of a tab operation to permit the torque bar to be returned to the disabling position by spring means in the printer. Since the details of construction of the control linkage 14, the tabulation operation mechanism 16, and the holding and restore means 18 are now known in the art, they are not described in further detail herein. Reference may be made to the IBM Selectric 72 Instruction Manuals for further details.

In the present invention, electrically operable actuation means are provided for actuating the control link means 10 between the disabling and the enabling position for all modes of operation. A plunger type solenoid means 20 of conventional design is operatively connected by circuit means 22 to sources of potential through an operating switch means 24 which is mounted on the printer for actuation by the tabulation key means 25 on the keyboard. Thus, whenever the tabulation key means 25 on the keyboard is depressed in the manual mode of operation, a pulse is carried to the solenoid means 20 and momentarily energize the coil of the solenoid means 20 and raise the plunger 26 whereby the link means 10 is moved from the disabling position to the enabling position through connecting linkage as hereafter described in detail. The solenoid means 20 is also operable in the automatic mode of operation by an input pulse derived from an input control system 28 which may be in the form of a tape reader and associated input circuitry or the like as will be readily apparent to and understood by those skilled in the art or by reference to the aforementioned U.S. patents. Thus, control link means 10 is operable electrically in all cases by momentary energization of the solenoid means 20.

The solenoid plunger 26 is operatively connected to the control link means 10 by connecting link means in the form of a bail 30 having a generally U-shaped configuration in plan elevation, as shown in FIG. 2, defined by spaced leg portions 32, 34 and a connecting web portion 36. The solenoid plunger 26 is pivotally connected through end portion 37 by a pin 38 to the leg portion 34. Bail 30 is pivotally mounted on a pin means 39 which extends

through both leg portions 32, 34. The lower end 40 of the control link means 10 is pivotally connected at 42 to the end of leg portion 32 so that pivotal movement of the bail 30 about the pin means 39 causes movement of the control link means 10 between the disabling position and the enabling position.

An electrical sensing means is provided to sense the start and the completion of a tabulation operation in the printer. The sensing means includes electrical output circuit means 46 having circuit conditioning means 48 by which an electrical signal indicative of the start and the completion of a tabulation operation in the printer may be delivered to the writing system control apparatus 50 as will be readily apparent to and understood by those skilled in the art or by reference to the aforementioned U.S. patents. In the preferred embodiment, the circuit conditioning means 48 comprises magnetically operable means in the form of reed-like blade-type contact members 56, 58 magnetically operable between open and closed positions. Devices of this type, mounted in glass envelopes, are known in the art and are shown generally in U.S. Patent No. 3,237,096.

Control means for operating contact members 56, 58 comprise magnet means 60 having north-south poles 62, 64 axially spaced along a magnet axis 66 as shown in FIG. 2. The magnet means 60 is preferably mounted transversely to the longitudinal axes of the contact members 56, 58 with one pole 62 spaced closely adjacent the magnetically operable contact members 56, 58 and is capable of establishing a magnetic field of sufficient intensity to cause actuation of the contact members 56, 58 to a closed position. The magnet means 60 and circuit conditioning means 48 are located on opposite sides of a slot 68. Flange members 56, 58 in the form of a portion 70 of the leg portion 34 extends into the slot 68 between the magnet means 60 and the contact member 58 in the lowered unactuated position of the bail 30.

Thus, whenever the control link means 10 is in the disabling position, the end portion 70 of the leg portion 34 forms a shield means in the magnetic field which is effective to sufficiently reduce the effect of the magnetic field to cause the contact member 58 to be opened. Whenever the tabulation operation mechanism in the printer is disabled, a signal indicative of that condition is received by the control apparatus 50. Whenever the tabulation operation mechanism in the printer is enabled by momentary energization of the solenoid means 20, the end portion 70 is pivoted upwardly to the position shown in FIG. 1 at 72 and the magnetic field is effective to close the contact members 56, 58 and provide a signal in the control apparatus 50 indicative of the occurrence of a tabulation operation in the printer.

The arrangement is such that the contact members 56, 58 are actually closed before the tabulation operation begins almost immediately after the plunger type solenoid actuating signal has been received and prior to completion of movement of the control link means 10 from the disabling position to the enabling position. Furthermore, when the control link means has been moved to the enabling position, the holding and restore means 18 is effective to maintain the control link means 10 in the enabling position until the tabulation operation is completed. The shielding leg portion 70 is also maintained in the raised position throughout the tabulation operation so that the magnet means 60 is continuously effective during the tabulation operation to close the contact members 56, 58 and provide an output signal in the control apparatus 50 throughout the length of the tabulation operation.

When the tabulation operation is completed the holding and restore means 18 is immediately effective to return the control link means 10 to the disabled position at which time the shielding end portion 70 is returned within the slot 68 to interrupt the magnetic field and open the contact members 56, 58. Thus, an output signal is provided

for the control apparatus 50 immediately upon completion of the tabulation operation. It will be readily appreciated by those skilled in the art to which this invention relates that the present electrical sensing means are effective to provide an output signal coterminous with the tabulation operation and independent of the mechanism by which the tabulation operation is selected and independent of variations in the lengths of tabulation effected.

The sensing means is mounted on a support member 74 which is centrally divided by the slot 68. The magnetically operable circuit conditioning means 48 is mounted on one side of the slot 68 in general parallel relationship therewith and the magnet means 60 is mounted on the other side of the slot 68. It has been found that, while the magnet axis 66 may also be mounted parallel to the longitudinal axis of the contact members 56, 58, particularly advantageous results are obtained by mounting the magnet means 60 with the magnetic axis extending transversely to the slot 68 and the contact members 56, 58.

In the illustrative embodiment, the apparatus is conveniently mounted on a common support bracket 76 having an upstanding leg portion 78 to which the solenoid means 20 may be attached as indicated at 80, 82. Pin means 39 is mounted between spaced leg portions 78, 84. The member 74 is secured on the base of bracket 76 by suitable fastening means 88, 90. The entire support bracket 76 is secured to a frame element 92 on the typewriter by suitable fastening means 94, 96.

The invention claimed is:

1. In a printer having tabulation operation mechanism manually operable by selective actuation of tabulation key means in a manual mode of operation and automatically operable upon receipt of a signal from an input control system in an automatic mode of operation, the improvement comprising:

tabulation operation control link means operably connected to the tabulation operation mechanism in the printer and being movable between a tabulation operation disabling position and a tabulation operation enabling position,

a single electrically operable link actuation means responsive to an electrical input signal and operatively connected to said tabulation operation control link means and being operable upon receipt of an electrical input signal to actuate said tabulation operation control link means to the tabulation operation enabling position,

said electrically operable link actuation means being the only actuation means associated with said tabulation operation control link means,

input signal circuit means connected to said electrically operable link actuation means,

operating switch means separate from said tabulation operation control link means controllably associated with said input signal circuit means and operably associated with the tabulation key means and being operable thereby in the manual mode of operation of the printer to provide an electrical input signal to said single electrically operable actuation means causing operation of said link actuation means,

automatic operation input control system means separate from said tabulation operation control link means controllably associated with said input signal circuit means and being operable in the automatic mode of operation of the printer to provide an input signal causing operation of said link actuation means,

and electrical sensing means operatively associated with said tabulation operation control link means to sense the position of said link means and to provide an indication of the initiation and completion of a tabulation operation in the printer.

2. The invention as defined in claim 1 and having holding and restore means operable to hold said tabulation operation control link means in the enabling position after termination of an input signal causing operation of said

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electrically operable link actuation means until the tabulation operation is completed and to restore said tabulation operation control link means to the disabling position upon completion of the tabulation operation.

3. The invention as defined in claim 2 and wherein said electrical sensing means comprises electrical circuit means and circuit conditioning means in said circuit means operable by movement of said tabulation operation control link means to change the condition of said electrical circuit means.

4. The invention as defined in claim 3 and wherein said circuit conditioning means comprises magnet means and magnetically operable means changeable from a first condition to a second condition in said circuit means, and magnetic shield means operatively associated with said tabulation operation control link means and positioned and movable relative to said magnetically operable means so as to actuate said magnetically operable means between the first and second conditions upon movement of said link means from the disabling position to the enabling position.

5. The invention as defined in claim 4 and said magnetically operable means and said magnet means being spaced from one another a distance such that said magnet means is effective to actuate said magnetically operable means to the one of the positions, said magnetic shield means comprising flange means operatively connected to said tabulation operation control link means and being moveable thereby between a first position between said magnet means and said magnetically operable means and preventing actuation of said magnetically operable means by said magnet means and a second position removed from between said magnet means and said magnetically operable means and enabling actuation of said magnetically operable means by said magnet means.

6. The invention as defined in claim 1 and having: electrical output circuit means having a changeable condition for indicating whether the tabulation operation control link means is in the tabulation operation disabling position or the tabulation operation enabling position,

magnetically operable circuit conditioning means controllably associated with said electrical output circuit means to change the condition thereof and comprising contact members operable between open and closed contact positions and being operable to one contact position under magnetic influence and returnable to the other contact position upon removal of the magnetic influence,

said magnetically operable circuit conditioning means being fixedly mounted on said printer adjacent said tabulation operation control link means,

magnet means for establishing a magnetic field capable of actuating said contact members to the one of the contact positions,

said magnet means being fixedly mounted on the printer adjacent and sufficiently close to said magnetically operable circuit conditioning means to establish a magnetic field capable of actuating said contact members to one of the contact positions and holding said contact members in the one of the contact positions,

movable shield means operable concurrently with said tabulation operation control link means and being

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movable between spaced positions and in one position of said tabulation operation control link means being located in a shield position between said circuit conditioning means and said magnet means in said magnetic field and being effective in the magnetic field to prevent actuation of said circuit conditioning means by said magnet means,

said movable shield means in the other position of said tabulation operation control link means being located in an unshielding position in spaced relationship to said magnet means and being ineffective in the other position to prevent actuation of said circuit conditioning means by said magnet means, and said magnet means being effective in the unshielding position of said movable shield means to actuate said contact members to the one contact position.

7. The invention as defined in claim 6 and wherein: said single electrically operable link actuation means comprises:

electrically operable solenoid means actuatable by the electrical input signal and having reciprocally mounted armature means movable between an activated position and a deactivated position upon actuation of said solenoid means,

connecting link means connecting said armature means to said tabulation operation control link means, pin means pivotally supporting said connecting link means whereby said connecting link means is pivotally displaceable during movement of said armature means to cause movement of said tabulation operation control link means between the disabling position and the enabling position during movement of said armature means.

8. The invention as defined in claim 7 and said movable shield means being provided by a portion of said connecting link means.

9. The invention as defined in claim 8 and having common support bracket means for said solenoid means, said connecting link means, said shield means, and said circuit conditioning means.

10. The invention as defined in claim 7 and having a support bracket for said circuit conditioning means and said magnet means, a slot formed in said support bracket between said circuit conditioning means and said magnet means, and movable shield means being provided by a portion of said connecting link means extending into said slot in the disabling position so as to provide a shield between said circuit conditioning means and said magnet means.

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