Jan. 5, 1954 A. M. WASSEF 2,665,067

APPARATUS FOR EFFECTING A DESIRED SEQUENCE OF OPERATIONS

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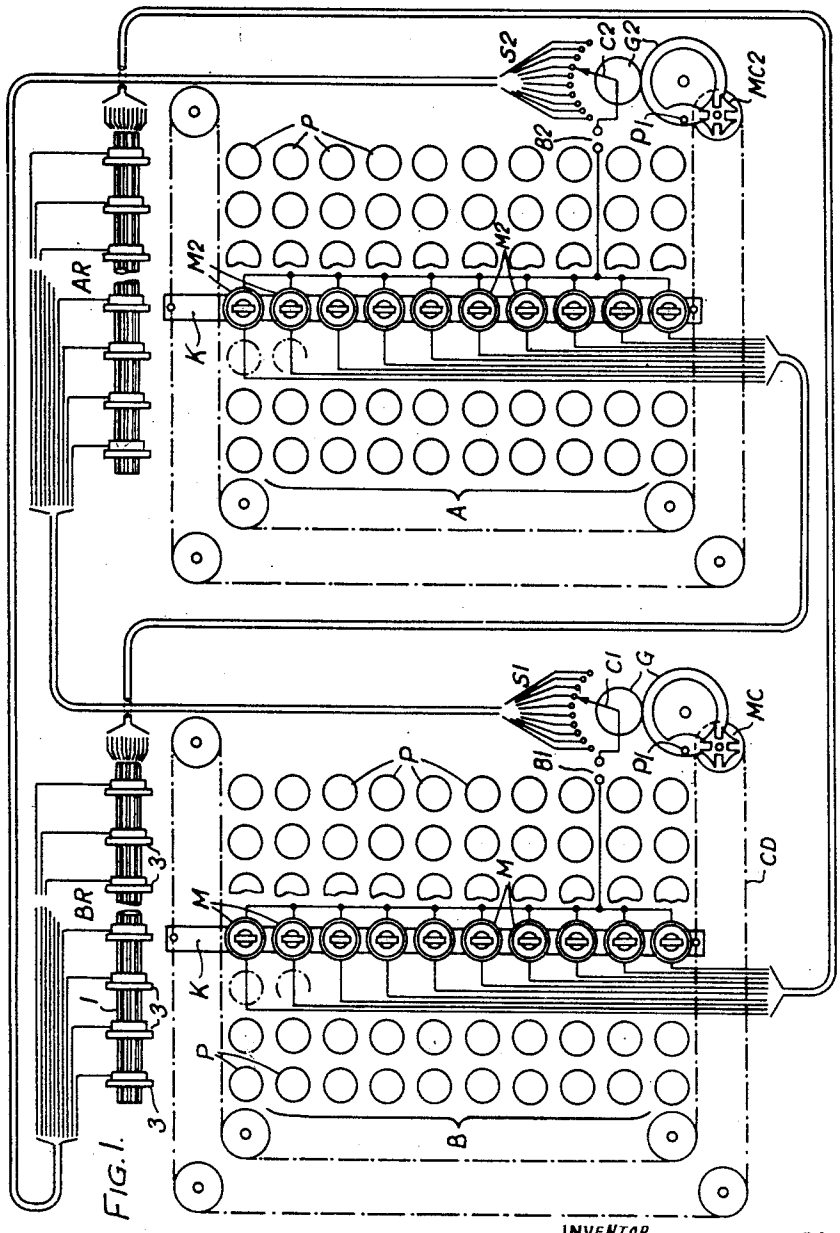


FIG. 1.

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FIG. 2.

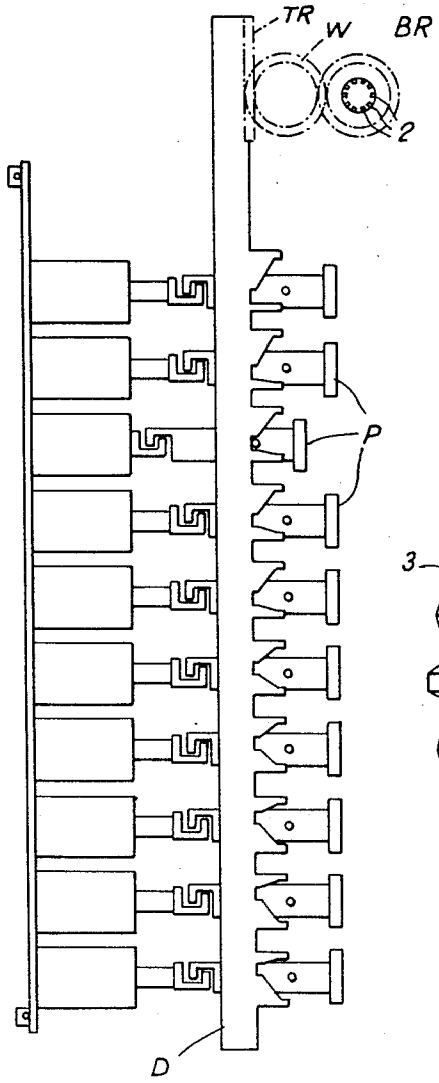


FIG. 3.

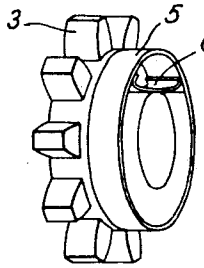
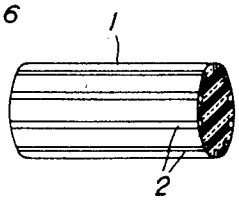


FIG. 4.



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APPARATUS FOR EFFECTING A DESIRED SEQUENCE OF OPERATIONS

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Claims priority, application Great Britain April 29, 1949

2 Claims. (Cl. 235—61)

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This invention relates to apparatus for effecting a desired sequence of operations and has particular although not exclusive reference to apparatus for carrying out computational processes of the kind performed by calculating and similar machines.

In certain known forms of calculating machines, mechanical considerations impose limitations upon the capacity of the machines for storing numbers and the transfer of the stored information to other machines. It is accordingly necessary to break up the sequence of operations and to set the result of a given stage onto the machines by hand, this process involving an undesirable expenditure of time and also presenting a source of possible error which may require duplication of the calculating process for checking purposes. The advantage of the rapid calculating properties of machines are therefore partly lost and one object of the present invention is to enable any of a number of numbers for example, to be set onto a calculating machine, typing machine or other machine for controlling operations of various kinds. A further object of the invention is to simplify the performance of computational and similar processes and to extend the range of usefulness of known types of apparatus to which the invention may be applied.

According to the present invention, an information storage register comprises two sets of electrically conducting members which individually represent numerals or letters for example, and are normally insulated from each other, are arranged to be connected together in a manner corresponding with a number, combination of letters, intelligence to be stored, or an operation to be performed and means are provided for sequentially selecting the members so connected together and to cause responsive devices such as solenoids or relays to be energised. The responsive devices may be used to perform any desired operation such as the depression of keys of a calculating machine or the typing, printing or recording of the stored information.

The storage register in a preferred form comprises a cylindrical assembly of elongated conductors insulated from each other and a plurality of toothed wheels provided with slip rings each having one or more conducting portions disposed so as to make contact with the elongated conductors. The toothed wheels constitute digit wheels and individual brushes are urged to engage the slip rings, the brushes being connected to any one of a number of circuits. The circuits to the brushes of each digit wheel are isolated from each other but the circuits from the slip rings are common among all the digit wheels.

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The positions of the digit wheels may be set by hand or by any of the known methods of keyboard setting employed on desk calculators or they may be set electromagnetically for example.

In order that the invention may be more clearly understood and readily carried into effect one form of calculating apparatus to which the invention is applied will now be described by way of example with reference to the accompanying drawings in which:

Fig. 1 illustrates diagrammatically calculating apparatus in which information stored in a register in one machine may be set up electrically on another machine.

Fig. 2 is an end elevation of part of the apparatus as seen from the left of Fig. 1, and

Figs. 3 and 4 show elementary portions of the electrical storage registers.

Referring to the drawings, it is convenient first to describe the construction of the storage registers used. A rod of insulating material 1 is formed with ten grooves in its surface and each groove accommodates a strip conductor 2. The rod and conductor surfaces are shaped so that the assembly constitutes a cylindrical bearing surface for ten toothed wheels 3 also composed of insulating material and each formed with a boss 4 providing a support for a band of conducting metal or slip ring 5. Each slip ring has connected to it a short metal strip 6 which makes contact with the strip conductors 2 in succession as the toothed wheel is rotated. The toothed wheels will be referred to as digit wheels.

Brushes of any suitable form, not shown, are arranged to bear on the slip rings and are connected to separate conductors which are led to a selector switch, other conductors being led from the strips 2 to solenoids for example, for the purpose now to be described in greater detail.

For the purpose of explanation, the keyboards A and B will be referred to as the keyboards of a desk calculating machine and a storage register respectively and each having ten rows of push

buttons P. Such keyboards are themselves of familiar type. The storage register AR will be assumed to be operated by meshing directly with a register in an existing calculating machine so that any number set up in the usual way on the register of the calculating machine will be stored by the device AR. The storage device BR will be assumed to have transferred to it the number stored by AR so that the latter may be cleared and the stored information set up subsequently on the same or another machine.

It will be seen that the digit wheels of the device AR are connected by the leads shown to the fixed contacts of a selector switch S1 the rotary contact arm C1 of which is driven through gearing G by an electric motor not shown. The contact arm C1 is connected to one terminal of a source of current B1 the other terminal of which is connected to ten solenoids M in parallel. Individual leads from the solenoids are connected as shown to the strip conductors of the device AR. The solenoids M are mounted on a traversible carriage K which is driven back and forth by chain drive CD operated by a maltese cross movement MC engaged by a pin P1 on the gearing G. This back and forth movement of the traversible carriage is effected by the reversible motor DM which drives gearing G. The plungers of the solenoids are arranged, on energisation to depress the buttons of the keyboard B. Depression of a button is accompanied by actuation in known manner of one of a number of spring loaded bars D one end of each of which is provided with a toothed rack TR which engages one of a number of toothed wheels W arranged to mesh with the digit wheels of the storage register BR.

In operation, driving of the selector switch S1 will result in energisation of the solenoids M in the order determined by the condition set up on the storage register AR, the carriage on which the solenoids are mounted being traversed to and fro to the necessary extent as determined by the relationship between the switch contact arm and the driving gear. When the full sequence of switch contacts have been engaged, the digit wheels of storage device BR will be set to correspond with the condition transferred from the device AR.

The return of the above assemblies to normal upon completion of an entry may be effected if the carriage K is pushed from one side to the other by hand, although a motor drive may be substituted therefor.

Clearly any desired condition to be stored can be set up on the storage device BR by manual depression of the keys of the board B instead of automatic transfer from a register as described.

The condition stored on the register BR can subsequently be transferred to a calculating machine of any appropriately modified form. Thus, if desired, the storage device can be connected through a selection switch to ten solenoids fixedly mounted in any known form of calculating machine provided with setting keys normally operated by hand so that the stored condition can be transferred directly onto the machine.

Alternatively an arrangement as further illustrated in the drawings may be used in which the condition stored can be set up on the keyboard A. The operation is in general similar to that already described and it will be seen that, the digit wheels of the device BR are connected to the selector switch S2 having associated parts C2, G2, MC2 and a source of current B2 corresponding with those parts associated with the keyboard. On operation of the switch S2 the solenoids M2 will operate the push buttons of the keyboard A and set up thereon the condition stored by the device BR. The drive and control arrangements are similar to those already described in connection with Fig. 3.

It will be seen from the arrangement described that a complete number may be transferred digit by digit from a calculating machine register to a store, using only $10+n$ wires to connect an n-digit register.

Instead of using a single row of ten traversing solenoids, ten rows each of ten solenoids fixed in position may be used and in such a case the electrical connections would be modified to switch the ten circuits from one set of solenoids to the next at each step of the selection switch.

The storage register device described may be adapted for use with a sum, product or multiplier register or in connection with a multiplication device of a single cycle calculating machine. Again, a product and a multiplier register may be constituted by the device described and the device may be constructed so that it can be readily attached or detached.

Extra storage registers may be used externally to a machine when it is desired to store values for setting up on a machine or to store the results of a calculation.

The automatic actuation of keys, levers and so forth of calculating machines by a device constructed to operate in accordance with the invention facilitates the performance of calculating or other operations with considerable saving of time and effort by an operator. The sequential operations to be performed may be controlled by a tape of known type or by rotary means.

I claim:

1. Apparatus for storing and reproducing information including a storage register unit comprising a plurality of wheels, at least one conductor and one slip ring carried by and electrically insulated from each of said wheels, a spindle common to said wheels, a plurality of elongated conductors carried by and insulated from said spindle, means for rotating said wheels, said elongated conductors being so disposed in relation to the conductors carried by said wheels, that on rotation of said wheels conductors carried thereby engage said elongated conductors in succession, electromagnetic devices arranged to perform an operation such as the depression of keys of a calculating machine, a selector switch in circuit with said electromagnetic devices for energizing said electromagnetic devices, a source of electric current supply adapted to be connected to said electromagnetic devices by said conductors carried by said wheels and said elongated conductors, and means operatively associated with said electromagnetic devices and said selector switch for traversing said electromagnetic devices back and forth with respect to the keys of a calculating machine.

2. An apparatus for storing and reproducing information including a storage register unit comprising a spindle composed of insulating material, a plurality of elongated conductors carried by said spindle, a plurality of wheels axially spaced along said spindle, at least one conductor and one slip ring carried by and electrically insulated from each of said wheels, means for rotating said wheels, said elongated conductors being disposed in relation to the con-

ductors carried by said wheels that on rotation of said wheels conductors carried thereby engage said elongated conductors in succession, electromagnetic devices arranged to perform an operation such as the depression of keys of a calculating machine, a selector switch in circuit with said electromagnetic devices for energizing said electromagnetic devices, a source of electric current supply adapted to be connected to said electromagnetic devices by said conductors carried by said wheels and said elongated conductors, and means operatively associated with said electromagnetic devices and said selector switch for traversing said electromagnetic devices back and forth with respect to the keys of a calculating machine.

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References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
2,088,355	Wehming	July 27, 1937
2,121,227	Haegele	June 21, 1938
2,147,626	Bryce et al.	Feb. 21, 1939
2,178,064	Bryce	Oct. 31, 1939
2,293,127	Fishack et al.	Aug. 18, 1942
2,434,500	Leathers et al.	Jan. 13, 1948
2,469,754	Tierney	May 10, 1949
2,497,784	Mehan et al.	Feb. 14, 1950

FOREIGN PATENTS

Number	Country	Date
580,675	Germany	July 19, 1933