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TYPING MECHANISM WITH CONSTANTLY ROTATING TYPE WHEEL

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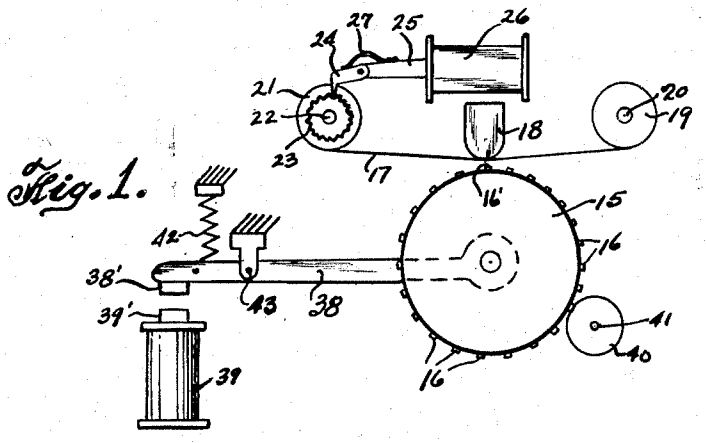


Fig. 1.

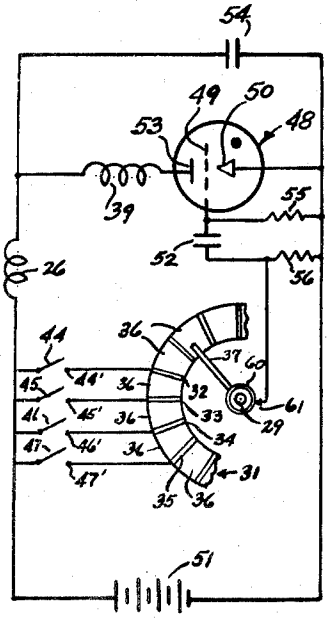


Fig. 3.

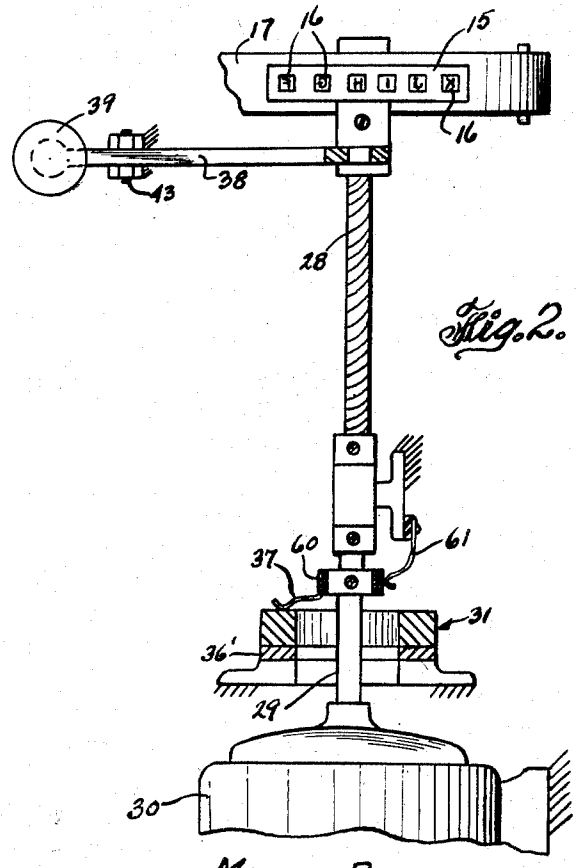


Fig. 2.

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TYPING MECHANISM WITH CONSTANTLY ROTATING TYPE WHEEL

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6 Claims. (Cl. 197—12)

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The present invention relates to typing mechanisms in general of the class which employs a rotating drum carrying the type elements and includes an electrical system for operation, whose switchboard is the keyboard. This mechanism is adaptable for use in typewriters, teletypewriters, printing ticker devices, inter-office communicators, and the like.

The principal object of this invention is to provide novel and improved electrically operated apparatus of the character mentioned, of a simplified construction requiring a minimum of moving parts, whose type-carrying drum is constantly rotating while the machine is in use. A prime advantage of this mechanism is that it affords a fast typing speed.

A further object of this invention is to provide typewriting apparatus of the kind set forth, of novel and improved structure both electrically and mechanically, which is reasonably cheap to manufacture, easy to use and efficient in carrying out the purposes for which it is designed.

Another object of this invention is the elimination of the ribbon and most of the noise of operation inherent in present machines of similar function.

Still another object is to permit rapid and easy interchange of the entire set of type, thus allowing use of different languages, sizes and kinds of type, and any form of special symbols, in the same machine.

A further object is to provide for a larger number of type in one machine as compared to the number of type in present machines of similar function.

Another object of this invention is to allow the use of interchangeable keyboards, where the keys of said keyboard may be of any shape and mechanical arrangement desired.

Other objects and advantages will become apparent as this disclosure proceeds.

In the accompanying drawings forming part of this specification, similar characters of reference indicate corresponding parts in all the views.

Fig. 1 is a schematic fragmentary plan or top view of an embodiment of this invention. Although shown as a device by which printing is done on a tape, those versed in this art, will readily be able to utilize its principles for the construction of office typewriters, teletypewriters, inter-office communicators, and the like.

Fig. 2 is a front view of Fig. 1, shown partly in section.

Fig. 3 is a schematic circuit diagram of the electrical system employed for operation of the typewriting device illustrated.

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In the drawings, the numeral 15 designates a drum or wheel, carrying printing type elements 16, equi-spaced on its periphery, the faces of which pass a slight distance from the tape 17 as the wheel rotates. This tape rests against and is movable across a fixed platen 18. The numeral 19 denotes a freely rotatable tape-supply spool on a fixed axis 20, and the numeral 21 designates a tape wind-up spool, rotatably mounted on fixed axis 22. Said wind-up spool carries a ratchet wheel 23, whose teeth are engaged by a pawl 24 pivotally carried on the armature 25 of a solenoid 26. The numeral 27 shows a blade spring, acting to maintain the pawl, so engaged.

The type wheel 15 is detachably mounted at the top end of a universal drive shaft, such as a flexible shaft 28, the other end of which is coupled to the shaft 29 of an electric motor 30. Concentrically fixed and spaced about the shaft 29, is a commutator 31 which is shaped as a ring and having radial conductor segments as 32, 33, 34 and 35 separated by insulator segments as 36 and 36'; said commutator having at least as many conductor segments as there are type elements 16 on the type wheel 15. A brush 37, in sliding contact with said commutator 31, is carried on shaft 29 and insulated therefrom. Brush 37 is connected to a slip ring (60) which is fixed on shaft 29 but is insulated therefrom. Fixed brush (61) contacting slip ring (60) is mounted on the frame but is insulated therefrom.

In the specific embodiment illustrated, the shaft 29 may be vertical and its coaxial flexible extending portion 28, may also be normally vertical, except when the latter is shifted as controlled by electromagnet 39. Upon operation of electromagnet 39, the type wheel 15 shall with some force, contact the tape 17. The numeral 40 indicates a freely revolvable inking wheel on a fixed axis 41. The type wheel 15, except when moved to the tape 17, is in constant rolling contact with said inking wheel 40, due to action of the tension spring 42.

The lever 38, is pivoted intermediate its ends, on a fixed axis 43. One end of said lever carries an armature 39' of soft iron, situated in the region of the core 39' of the coil 39, and the other end of said lever, serves to hold and journal the flexible shaft 28, at the type wheel 15. The ratchet 23 and its cooperating pawl 24, are so designed, that upon each actuation of the coil 26, the tape 17 is moved a distance equal to the desired horizontal spacing between printed characters; rotation of the ratchet being clockwise. Since it is the function of coil 26 to operate the spacing mechanism, it will hereinafter be called, the spacing coil, while

the coil 39 which operates the printing mechanism, will be referred to as the printing coil.

Each key of a regular typewriter keyboard, has an associated fixed contact point which it touches when depressed. A group of such keys are shown in Fig. 3 in diagrammatic fashion, and are respectively indicated by the numerals 44, 45, 46 and 47. Their related contact points are shown at 44', 45', 46' and 47'. Of course, there are as many keys as there are type characters 16 on the type wheel 15. Each key and related contact point constitutes an electrical switch, as is well known in the art. All the keys of the keyboard are in electrical connection since they are all mounted on the machine frame. Since the keys are only in electrical relation to the rest of the mechanism, any desired mechanical arrangement may be used, and the entire keyboard may be made replaceable by means of a suitable plug and socket arrangement. The contact points mentioned, are insulatively mounted on said frame, and are respectively electrically connected to the conductor segments of the commutator 31. That is, contact points 44', 45', 46', 47' are respectively electrically connected to the commutator conductor segments 32, 33, 34, 35, and so on. Each of said commutator conductor segments is therefore related to a particular key, and their sequence of arrangement in the commutator assembly is akin to the position of the type elements 16 with respect to each other, so that when the brush 37 is in contact with a particular commutator conductor segment, the type character 16 determined by its related key is in a position such that it would produce the desired impressions on the tape if the printing coil 39 were energized.

Various systems of electrical arrangements are known in the art for the operation of the printing and spacing coils, which are suitable for adoption here, but I have devised a simple and practical circuit using standard electrical components, which I will now describe.

Included in the circuit shown in Fig. 3, is an electronic gas-filled tube 48, such as the 1D21, which as is well known, acts as a switch upon pulsing of its grid 49 positive. This is called "firing" the tube.

In the circuit shown, the cathode 50 of the tube 48, is connected to the negative side of the battery 51. The brush 37 is connected through slip ring 60, brush 61 and condenser 52, to grid 49. All keys of the keyboard, as 44, 45, 46 etc., and a terminal of the spacing coil 26, are connected to the positive side of the battery 51. One terminal of the printing coil 39 is connected to the plate 53 of the gas tube. The other terminals of printing and spacing coils 39 and 26, are connected to one side of condenser 54. The other side of this condenser is connected to the cathode 50. Both sides of condenser 52 are connected to the negative side of the battery 51 through the high resistances 55 and 56, respectively. In this circuit it is evident that the spacing coil 26, the printing coil 39 and the gas-tube 48, in electrical series connection in the order mentioned, are connected across the battery 51, whereby the plate 53 is charged positive through said coils. Also, that the condenser 54 is across the series connected gas-tube 48 and printing coil 39, whereby said condenser 54 and the spacing coil 26, are in series across the battery 51. As previously stated, the contact points as 44', 45', etc., are respectively connected to the commutator conductor segments as 32, 33 etc.

It is to be noted that at any position of the type wheel 15 while it is rotating at normal operating speed, the brush 37 contacts such segment of the commutator 31, that the character marked on the key associated with said segment, is the same character as that of the type element 16 which would be at printing position opposite to the platen 18.

In operation, the type wheel 15, is continuously rotating, that is, motor 30 is continuously operating. The switches which have the keys of the keyboard as operating members, are all in open condition. The condenser 54 is charged to the potential of battery 51. One of these keys is pressed down, say the key 45 is pressed down to contact the point 45'. As soon as brush 37 makes contact with the commutator segment 33, the grid 49 of the gas tube 48 is pulsed positive. This causes the tube to "fire," that is, it becomes a conductor, whereupon the condenser 54 discharges through the printing coil 39, causing armature 38' to be attracted to core 39', and hence the type wheel 15 will be struck against the tape 17 on the platen 18. The type element 16 at such printing position, having an ink-wetted surface due to its rolling contact with the inking wheel 40, will therefore make an impression of its character onto the tape 17. Such discharge of the condenser 54, is made practically instantaneous, by suitably choosing the value of its capacitance with respect to the inductance of the printing coil 39. The stressed spring 42 will restore the wheel 15 to its normal position away from the platen 18. Although the type wheel is continuously rotating during the printing operation, a clear impression is produced due to the rapidity with which the armature 38' is actuated. The condenser 54 discharges through the printing coil and the tube 48, until the potential of said condenser drops to the point where the tube 48 cuts off, that is, the tube stops conducting.

The condenser 54 now charges up from the battery 51, during which time, the spacing coil 26 is energized by such passage of energy, causing the tape 17 to be moved with respect to the platen 18, a distance equal to the desired horizontal spacing between consecutive characters 16. The mentioned actuation of the spacing coil 26, takes place immediately after the tube 48 stops conducting, and occurs only as long as the condenser 54 is recharging. The armature 25 of the spacing coil 26 being spring loaded, not shown, said armature will be restored to its normal rest position. It might here be noted that the condenser 52 is included, in order to block direct current to the grid 49, and rely upon electrical surge to pulse the said grid. The resistors 55 and 56 serve to keep said condenser 52 in discharged state.

The machine is now ready for the next typewriter key to be pressed down by the typist, and of course a repetition of the cycle of operation.

It may be noted that for efficient operation of this circuit, each key should make contact for more than the time for one revolution, and for less than the time for two revolutions of the type wheel. One way of accomplishing this is by constructing a key by means known in the art such that the time of contact is always fixed by mechanical considerations, regardless of how long the operating lever of the key is depressed.

Some slight adjustment may have to be made in typewheel position, to take into account the slight amount of rotary movement of said wheel during the interval it moves towards the platen

18, so that the type element against the tape 17, makes a proper impression, and also if the shaft 28 is run at different speeds.

It is possible to include on one type wheel several lanes of type, each lane being sufficiently separated so that only one lane at a time is in printing relation to the tape. In this way a considerable number of sets of type may be included in one machine. Shifting means to shift the type wheel up or down with respect to the tape must be provided so that each lane may be brought into printing relation with the tape; such shifting being controlled by auxiliary switches as keys added to the keyboard. These shifting means and control of same are well known in the art, and therefore need not be shown or explained in detail herein. With such arrangement no change is required in the key circuit as each key will correspond with one character in each lane.

This invention is capable of numerous forms and various applications without departing from the essential features herein disclosed. It is therefore intended and desired that the embodiments described herein be deemed illustrative and not restrictive and that the patent shall cover all patentable novelty herein set forth; reference being had to the following claims rather than to the specific description herein to indicate the scope of this invention.

I claim:

1. In a typewriting apparatus of the character described, the combination of a platen, a type wheel having printing characters thereon in spaced relation along a circular lane thereof, means including an electro-magnet to shift the type wheel whereby a portion of said lane thereof contacts the platen momentarily, and a circuit including said electro-magnet, an electronic switch device and a source of electrical energy in series electrical connection with each other whereby upon operation of said electronic switch device, the electromagnet is actuated momentarily; said electronic switch device including a grid member and a circuit establishing at will on said grid member, a voltage suitable for operating said electronic switch device and thereby causing the imprinting of a character upon the platen.

2. A typewriting apparatus as defined in claim 1, wherein a capacitor is interposed between the source of electrical energy and the electronic switch device.

3. A typewriting apparatus as defined in claim 2, including means for shifting the surface to be printed on a distance equal to the predetermined

spacing between characters to be imprinted on said surface; said means including an electro-magnet in circuit with the capacitor and the electric energy source, whereby the capacitor charges up through this electro-magnet thereby operating said shifting means.

4. In a typewriting apparatus of the character described, the combination of a platen, a type wheel having printing characters thereon in spaced relation along a circular lane thereof, means including an electromagnet to shift the type wheel whereby a portion of said lane thereof contacts the platen momentarily, a rotatable switch arm, means for constantly rotating said switch arm and the type wheel in unison, contact sections arranged in a circle adapted to be swept by said switch arm and a circuit including said electro-magnet, an electronic switch device and a source of electrical energy in series electrical connection with each other whereby upon the operation of said electronic switch device, the electro-magnet is actuated momentarily; said electronic switch device including a grid member and a circuit establishing at will on said grid member, a voltage suitable for operating said electronic switch device through a contact section corresponding with a given character, which section when swept by said switch arm, will cause the imprinting of a corresponding character upon the platen.

5. A typewriting apparatus as defined in claim 4, wherein a capacitor is interposed between the source of electrical energy and the electronic switch device.

6. A typewriting apparatus as defined in claim 5, including means for shifting the surface to be printed on a distance equal to a predetermined spacing between characters to be imprinted on said surface; said means including an electro-magnet in circuit with the capacitor and the electric energy source, whereby the capacitor charges up through this electro-magnet thereby operating said shifting means.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
734,526	Ennis	July 28, 1903
779,518	Bates	Jan. 10, 1905
1,520,089	Scherbius	Dec. 23, 1924
1,652,463	Tyberg	Dec. 13, 1927

FOREIGN PATENTS

Number	Country	Date
283,501	Italy	Mar. 13, 1931