Oct. 9, 1956 R. A. HIGONNET ET AL 2,765,895

REGISTER FOR TYPE COMPOSING APPARATUS

Filed Jan. 8, 1953

2 Sheets-Sheet 1

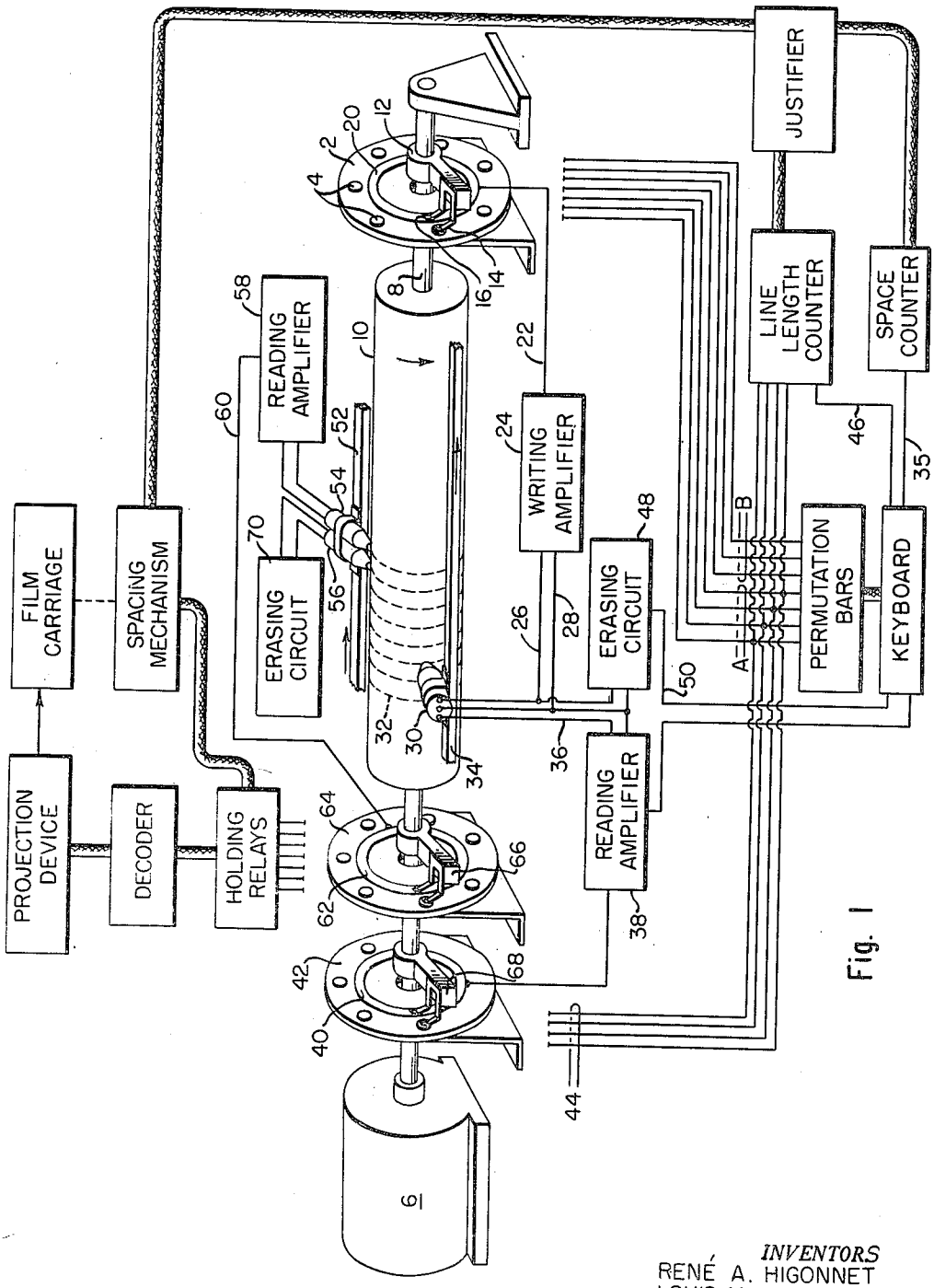


Fig. 1

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2 Sheets-Sheet 2

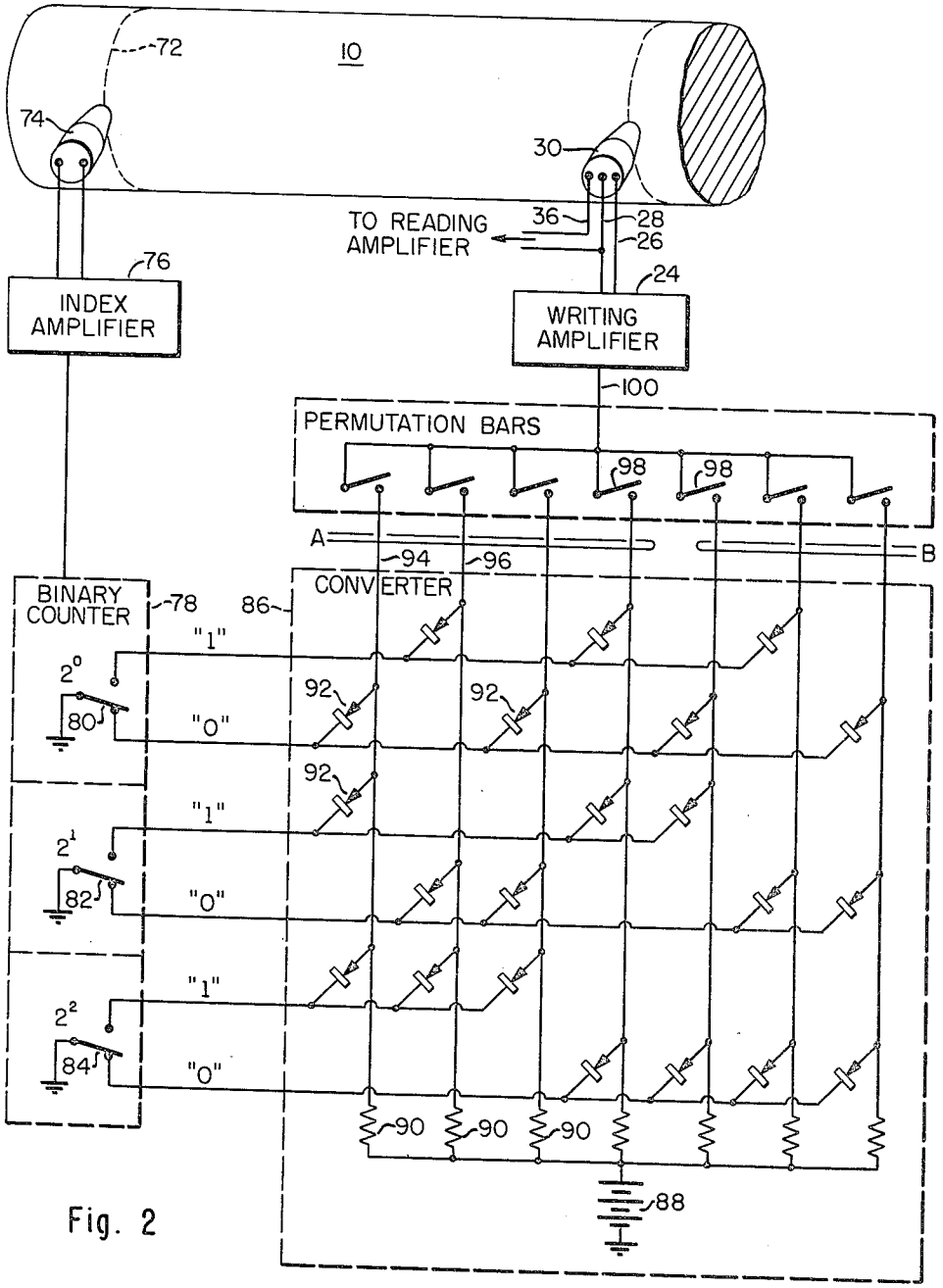


Fig. 2

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REGISTER FOR TYPE COMPOSING APPARATUS

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Claims priority, application Great Britain January 11, 1952

8 Claims. (Cl. 197—19)

The present invention relates to type composing apparatus, and more particularly to apparatus including a register for storing information corresponding to the selected characters in a line, consisting of a continuously rotating magnetic drum, and means associated therewith operative to magnetize, or to sense the magnetization of, selected areas of the drum surface, under the command of a keyboard.

In the type composing art, the requirement of a register or recording device has long been understood and appreciated. The register provides means to store information corresponding to the selected characters for a certain period of time prior to their final transcription, that is, their ultimate arrangement in the desired form, order, and spaced relationship in the line. Although simplicity is achieved, as in an ordinary typewriter, by causing each character to be typed or transcribed in final form simultaneously with the actuation of the corresponding key of the keyboard, it is not possible to justify a line of such characters in a satisfactory manner, that is, to bring both the left and right extremities of the line to common margins with the other lines previously and subsequently composed. For such purpose, a memory unit having a capacity sufficiently large to record information corresponding to a full line of characters at a time is required. It is then possible to measure the deficiency or overage of the aggregate widths of the selected characters and spaces, and to provide a justifier adapted to adjust the relative spacing of the characters and words by the appropriate amounts.

It has also been recognized that the register may be useful in permitting the operator, after a line has been recorded, to make any necessary corrections of erroneously selected characters prior to the transcription of the line. Thus, if the line is read by the operator immediately after typing and recording, and it is found that one character was inadvertently typed for another, the apparatus may be arranged to permit erasure of the erroneous character from the register. The insertion in its place upon the register of the correct character may then proceed, and the justification adjustments within the line may be altered in a corresponding manner to provide correct justification, even though the assigned width values of the erroneous and correct characters are different.

In some types of apparatus, such as telegraph systems, a register for selected characters also permits the adjustment of the speed of transmission to a value different from the speed of character selection.

Heretofore, a large variety of registering devices have been constructed or proposed. In early devices, the memory function was performed by the actual storage of character matrices, selected for example from a magazine as in the case of the Linotype machine. More recent devices employ the so-called "code" type of recording. One form of code device is exemplified by the punched tape, as used in the well-known Monotype machine. Another similar type is exemplified by the flat bed register

comprising banks of depressable pins, described in our copending application Serial No. 770,320, filed August 23, 1947, or the register described in the patent to Bush, No. 2,379,862.

In these latter registers, temporary memory means are provided, consisting of a plurality of mechanically deformable or displaceable code elements adapted for selection according to a code system, whereby each character has assigned to it a discrete combination of the elements. It is possible to adapt these elements to be deformed or displaced into two, three, or an even greater number of positions, and it is apparent that for a greater number of stable conditions of each element, a lesser number of code elements per character for a given number of possible characters is required. However, in practice it has been found that the memory elements should preferably have only two stable conditions, whereby a binary system of character coding can be readily accommodated.

According to the present invention, the character memory is provided by a rotating drum having a magnetic surface thereon suitable for storing information in the form of discrete magnetic spots arranged according to a code.

A principal object of the present invention is to provide a register of the above type suitably adapted for entry of character information in the form of an appropriate code from a keyboard, and for reading said information at the desired moment from the drum, whereby the selected characters are transcribed.

Another object is to provide a register of the above type adapted for rapid and convenient correction of characters erroneously entered upon the register.

Another object is to provide erasing means, whereby information corresponding to a character stored on the register may be erased after reading and transcription, to liberate the area allocated to the character for use to store a character in the succeeding line.

A principal feature of the invention is the combination of a drum having a number of spaced rings or paths, there being one ring for each of the largest possible number of characters and spaces in a single line, with a pair of electromagnetic reading and recording heads, each disposed in operative relation with said rings, and movable intermittently from ring to ring.

Another feature is the combination with the drum and the reading and recording heads of two or more distributors, which may be rotary switches or electronic devices, by means of which the appropriate connections may be made to the keyboard on the one hand, and to the transcription apparatus on the other hand.

Still another feature is the combination with the recording head of a distributor or similar device, and a circuit whereby an erroneous character may be detected and the width thereof subtracted from the aggregate value of the characters and spaces previously selected for the given line, to permit the recording of the correct character upon the ring previously allocated to the erroneous character, and the addition of the width of the correct character to said aggregate value.

Another feature permits the simultaneous transcription of one line and the recording of the succeeding line, the recording being allowed to proceed as rapidly as the characters of the preceding line are transcribed.

Other features of the invention comprise certain structures, modes of operation, arrangements and combinations as hereinafter more fully described and particularly defined in the claims.

The invention will be described with reference to the appended drawings, in which

Fig. 1 represents in partially diagrammatic form an

embodiment thereof as incorporated in a photographic type composing machine, and

Fig. 2 shows in partially diagrammatic form an alternative embodiment of the distributor.

Referring to the Fig. 1, a keyboard, preferably provided with the usual components of a non-justifying typewriter, is provided with a set of permutation bars of the type commonly employed in teleprinters. An arrangement of this type is described in some detail in our above-mentioned copending application, Serial No. 770,320, wherein the circuits are described as being connected with magnetic means for depressing the pins of a flat bed register of the type mentioned above. According to the present invention, the leads coming from the permutation bars are divided into a group designated by the character A and a group designated by the character B. The A group is connected with a line length counter, and both groups are connected with the stationary terminals of a distributor, which is represented by way of example as a rotary switch **2**, by means of which magnetic "spots" may be entered upon the drum, as hereinafter described, according to the particular combination of the leads A and B which are energized by the operation of the permutation bars.

In the arrangement shown by way of example, the A group of leads represents, in the binary form of notation, the width value of the selected character. Thus, the energized condition of one of the A leads indicates the coefficient "1" of a particular power of two, or digit in the binary number. It will be apparent that four leads permit the binary representation of any width from zero to fifteen units in value. The B group of leads is used for the purpose of distinguishing between characters of like width. Thus, if two characters have the same width, the identical combination of the A leads will be energized when each character is selected, but the combination of the B leads energized will be different in each case.

The rotary switch **2** is constructed with seven stationary buttons **4**, spaced preferably at equal intervals in a circle, one button being connected to each of the A and B leads. A motor **6** turns a shaft **8** continuously, thereby rotating not only a storage drum **10**, but also a brush arm **12** provided with two brushes **14** and **16**, electrically insulated from the shaft **8** but connected with one other as shown. The brush **16** makes contact with a slip ring **20**, whereby it is apparent that rotation of the arm **12** causes the contacts **4** to be brought into electrical connection successively for short periods with the slip ring **20**.

The slip ring **20** is connected by a lead **22** with a writing amplifier **24**, which is connected by leads **26** and **28** with a recording coil on a recording magnet **30**. The electrical circuitry of the amplifier **24** and the recording magnet **30** are not described, being already familiar to those skilled in the art. According to a well-known technique, each ring of the drum has as many areas or "spots" as there are buttons on the switch **2**, each "spot" corresponding to one of the A or B leads and having a certain magnetic state to represent the digit "one" if the lead is energized, and another magnetic state to represent "zero" if the lead is unenergized.

Thus, it will be apparent that the depression of a character key at the keyboard operates the permutation bars to energize a corresponding combination of the leads A and B leading to the switch **2**, and a number of local areas or "spots" on a ring **32** passing beneath the magnet **30** are magnetized in a corresponding manner.

The magnet **30** is preferably secured to a movable member **34** engaged in any suitable manner with the platen carriage of the non-justifying typewriter, whereby the magnet is advanced after each key actuation by the pitch of the typewriter. As represented in the figure, the line of characters is recorded from left to right, although if the member **34** is secured directly to the platen carriage the recording would proceed in the reverse direction.

As mentioned above, the A group of leads extending from the permutation bars is also connected with a line length counter, by means of which the aggregate length of the selected characters and spaces is accumulated for purposes of computing the justification requirements of the line. Also, a space counter is connected with the keyboard by a lead **35** to permit the counting of the spaces between which the difference between the desired length of the line and the accumulated length is to be divided. The details of the line length counter, the space counter and the justifier are not given, since they form no part of the present invention, and suitable examples of such circuitry are known and understood in the art of type composition. Another example is described in our copending application, Serial No. 70,472, filed January 12, 1949, and now Patent Number 2,682,814.

The speed of the drum is preferably adjusted so that one revolution is completed while each character key is in the depressed position. If desired, temporary holding means may be included, whereby the key may be released before the recording has been completed. Such means may include a relay circuit which is well known in the art.

When the operator has finished the typing of a given line, he may check for mistakes by viewing the unjustified line as typed on the typewriter. If, for example, he discovers that one character has been erroneously typed in place of another, he may erase the erroneous character and replace it with the correct character in a convenient manner without erasing and retyping the entire line, as follows:

The first step is to return the non-justifying typewriter platen carriage to the position in which the erroneous character was typed. This brings the recording magnet **30** opposite the ring containing the corresponding magnetic areas or "spots."

The next step, which may be initiated by depressing an "erase" key, is to read the magnetized spots by means of a reading coil on the recording magnet, which is connected between a lead **36** and the lead **28**, which is also connected to one terminal of the recording coil as previously mentioned. Electrical impulses, timed with the positions of the drum at which magnetized spots pass beneath the magnet **30**, are sent by this means to a reading amplifier **38**, which sends amplified output impulses to a slip ring **40** on a distributor represented, by way of example, as a rotary switch **42** constructed in a similar manner to the switch **2**. The buttons of the switch **42** are connected with leads **44**, which are connected in turn with the A leads coming from the permutation bars. It will be noted that there are only four buttons on the switch **42**. These four buttons are in the positions corresponding with the areas or "spots" on the drum **10** which in turn correspond with the A leads connecting the permutation bars with the switch **2**. Thus, the leads **44** are energized according to the binary representation of the erroneous character width. A signal from the keyboard to the line length counter over a lead **46** causes the width signal on the leads **44** to be sent into the line length counter reversely, so that the width value is subtracted from the counter. A suitable correction circuit for this purpose is described in our above-mentioned copending application, Serial No. 70,472.

The next step, which may be initiated automatically upon the completion of the preceding step in any suitable manner, is to energize an erasing circuit **48** adapted to send a signal to the recording coil returning each spot on the ring to the magnetized condition representing the digit "zero." In case the step is initiated from the keyboard, a lead **50** may carry a signal for this purpose. The circuit for accomplishing this purpose may include a distributor or rotary switch similar to those heretofore described.

Finally, the correct character is selected in the manner heretofore described. The fact that the correction has been made is preferably indicated on the unjustified type-

writer copy by striking the correct character directly over the erroneous character or immediately above it.

When a full line has been stored in the above manner, the transcription process may be initiated. A reading carriage 52 is adapted for intermittent movement along a line parallel to the axis of the shaft 8, for example by a ratchet and pawl device, not shown, having the same pitch as the platen of the non-justifying typewriter. Secured to the reading carriage in operative relation with the surface of the drum 10 are a reading magnet 54 and an erasing magnet 56, these magnets being so disposed that the magnet 54 is in operative relation with one ring, while the magnet 56 is in operative relation with the ring next to the left.

The reading process begins with the carriage 52 in its extreme left position, in which the magnet 54 is opposite the first ring of the recorded line. Electrical impulses generated by the magnetized spots are sent to a reading amplifier 58, which is connected by a lead 60 with a slip ring 62 of a distributor, represented in the figure as a rotary switch 64, constructed in a similar manner to the switches 2 and 42, but having its connections rotated with respect to those of the switches 2 and 42 by an angle corresponding to the angular displacement of the magnets 54 and 56 with respect to the magnet 30.

The seven buttons of the switch 64 are connected with a set of holding relays. These relays are energized in succession during a cycle of the drum 10. Holding circuits on the relays then sustain the energization until the selected character is projected upon a sensitized film through the coaction of a decoder with a projection device. The film carriage is then spaced through the actuation of the spacing mechanism, which is operated by the justifier and by the holding relays representing the character width in binary form. The holding relays, decoder, rejection device, film carriage, and spacing mechanism are all described in our above-mentioned copending application, Serial 770,320, and the details thereof form no part of the present invention.

After the character has been projected and spaced, the reading carriage 52 is advanced to the next ring, thereby bringing the erasing magnet 56 opposite the ring which has just been read. An erasing circuit 70 similar to the circuit 48 then energizes the erasing magnet 56 to return the magnetic spots to the condition representing the digit "zero," thereby liberating the ring for magnetization according to a new character in the succeeding line.

It will be obvious that the recording magnet, being driven by means operating independently of the reading magnet, may be energized to record the characters of one line while the reading magnet is simultaneously transcribing the preceding line, but that in such case the recording magnet should be prevented from overtaking and passing the reading magnet. Accordingly, appropriate means may be provided to restrain the mechanical movements of the member 34 and to freeze the keyboard, as described in our copending application, Serial No. 187,476, filed September 29, 1950, and now Patent Number 2,690,249.

It will be apparent from the above discussion that the angular displacement of the recording magnet and the reading and erasing magnets with respect to the drum 10 is purely a matter of convenience, but it has been found advantageous to place the magnets in opposed relationship, with the keyboard, non-justifying typewriter mechanism, and recording magnet in front of the drum, and the reading carriage with its associated magnets in the rear of the drum. This arrangement avoids any possible interference between the mechanisms for driving the recording and reading magnets.

It will also be understood that while the invention has been described with reference to an embodiment employing distributors in the form of rotary switches 2, 42, and 64, other devices of an equivalent nature may be substituted therefor. An example of such a device is shown diagrammatically in Fig. 2. In this figure an electronic

circuit adapted to replace the rotary switch 2 is shown. At one end of the drum 10 is situated an index ring 72 having eight magnetized spots, preferably distributed equally around the circumference. A fixed index magnet 74 is secured in operative relationship with the ring 72 to generate an electrical impulse each time a magnetized spot passes beneath the magnet. These index impulses are amplified by an index amplifier 76 and sent to the lowest order stage of a three-stage binary counter 78. The binary counter is of standard construction, and may have stages consisting of either relays or vacuum tubes, as desired. The stages of the counter have output switches 80, 82 and 84, each switch reaching a "1" position when the corresponding stage represents a "1" and a "0" position when the stage represents a "0."

The contacts of the switches 80, 82 and 84 are connected with a binary to octal converter 86 comprising a circuit connected with a battery 88, a group of resistors 90 and rectifiers 92. The rectifiers are so connected that only one of the A or B leads connected with the converter is at battery potential at any particular moment, this lead being the one which corresponds with the binary value represented in the counter. Thus, if the counter represents the binary number "001," which is equivalent to decimal "1," only the switch 80 is in the "1" position, and battery potential is present on a lead 94 but not on any other lead by reason of the connection of each such lead to ground through one or more of the rectifiers 92.

The counter 78 is arranged to count successively from "0" to "7," the maximum value it can represent. Thus, it counts through a complete cycle once per revolution of the drum 10. When the counter is in its "0" condition, battery potential is not available on any of the A or B leads. When the next index impulse is received the counter reaches position "1," and battery potential becomes available on the lead 94. The next index impulse causes battery potential to be available on a lead 95, and so forth. It will be obvious to those skilled in the art that the same result may also be produced by using a seven-stage counting ring, in which case the converter may be eliminated, but the number of index impulses per revolution of the drum 10 would also have to be reduced to seven.

The permutation bar circuit is basically the same as in the embodiment of Fig. 1. When any key is depressed at the keyboard, a corresponding combination of contacts 98 is closed and remains closed throughout at least one revolution of the drum 10. The blade of each switch is connected with a lead 100 connected with the writing amplifier 24. This amplifier applies a brief impulse to the recording magnet 30 at the moment when each of the A or B leads initially reaches battery potential, provided the corresponding switch 98 is then closed.

While the invention has been described with reference to a specific embodiment with certain variations, it will be apparent that other modifications, including the adaptation of the apparatus to devices other than photographic type composing machines, may be readily effected by those skilled in the art without departing from the spirit or scope of the invention.

Having thus described our invention, we claim:

1. In type composing apparatus, the combination of a non-justifying typewriter, code means operated by the typewriter keyboard for representation of each selected character and space in a line, a continuously rotating drum having a magnetic surface, a recording magnet engageable with the platen of the typewriter for intermittent movement in a path parallel to the drum axis, a circuit for energizing the recording magnet to magnetize selected areas of said surface according to said representation including a first distributor device synchronized with the drum and a circuit connected with said code means, a reading magnet for sensing the magnetized areas having mechanism for intermittent movement in a path parallel to the drum axis independently of the recording magnet,

transcribing means for said line, and a circuit for operating the transcribing means including the reading magnet and a second distributor device synchronized with the drum.

2. In type composing apparatus, the combination of a keyboard, code means operated by the keyboard for representation of each selected character and space in a line, a continuously rotating drum having a magnetic surface, a recording magnet, a circuit for energizing a recording coil on said magnet to magnetize selected areas of said surface according to said representation, means for accumulating the widths of said characters and spaces, and means to erase a character from the drum including a reading coil on said magnet for sensing the magnetized areas corresponding to the character, a circuit connected with the reading coil to reduce the accumulated widths by the width of said character, and an erasing circuit connected with the recording coil to alter the magnetization of said areas.

3. In type composing apparatus, the combination of a non-justifying typewriter, code means operated by the typewriter keyboard for representation of each selected character and space in a line, a continuously rotating drum having a magnetic surface, a recording magnet engageable with the platen of the typewriter for intermittent movement in a path parallel to the drum axis, a circuit for energizing a recording coil on said magnet to magnetize selected areas of said surface according to said representation, means for accumulating the widths of said characters and spaces, and means to erase a character from the drum including a reading coil on said magnet for sensing the magnetized areas corresponding to the character, a circuit connected with the reading coil to reduce the accumulated widths by the width of said character, and an erasing circuit connected with the recording coil to alter the magnetization of said areas.

4. In type composing apparatus, the combination of a non-justifying typewriter, code means operated by the typewriter keyboard for representation of each selected character and space in a line including its width in digital form, a continuously rotating drum having a magnetic surface, a recording magnet engageable with the platen of the typewriter for intermittent movement in a path parallel to the drum axis, a circuit for energizing a recording coil on said magnet to magnetize selected areas of said surface according to said representation, means operated by the width-representing code means for accumulating the widths of said characters and spaces, and means to erase a character from the drum including a reading coil on said magnet for sensing the magnetized areas corresponding to the character, a circuit connected with the reading coil to reduce the accumulated widths by the width of said character, and an erasing circuit connected with the recording coil to alter the magnetization of said areas.

5. In type composing apparatus, the combination of a non-justifying typewriter having a keyboard and a platen, code means operated by the keyboard for representation of each selected character and space in a line, a continuously rotating drum having a magnetic surface, a recording magnet engageable with the platen for intermittent movement in a path parallel to the drum axis, a circuit synchronized with the drum for energizing the recording magnet to magnetize selected areas of said surface according to said representation, a reading magnet for sensing the magnetized areas, and transcribing means for said line synchronized with the drum and operatively associated with the reading magnet.

6. In type composing apparatus, the combination of a non-justifying typewriter having a keyboard and a platen, code means operated by the keyboard for representation of each selected character and space in a line, a continuously rotating drum having a magnetic surface, a recording magnet engageable with the platen for intermittent movement in a path parallel to the drum axis, a circuit synchronized with the drum for energizing the recording magnet to magnetize selected areas of said surface according to said representation, a reading magnet movable intermittently and independently of the recording magnet in a path parallel to the drum axis for sensing the magnetized areas, and transcribing means for said line synchronized with the drum and operatively associated with the reading magnet.

7. In type composing apparatus, the combination of keyboard operated means for coded representation of each selected character and space in a line including its width in digital form, a storage device having a magnetic surface, recording magnet means, a circuit operated by the keyboard to energize the recording magnet means to magnetize selected areas of said surface according to said representation, means operated by the keyboard for accumulating the widths of said characters and spaces, and means to erase a character from the surface including reading coil means on said recording magnet means for sensing the magnetized areas representing the width of said character, a circuit connected with the reading coil means to reduce the accumulated widths by the sensed width, and an erasing circuit connected with the recording magnet means to remove the entire code representation of said character.

8. In type composing apparatus, the combination of a non-justifying typewriter having a keyboard and a platen, code means operated by the keyboard for representation of each selected character and space in a line, a storage device having a magnetic surface, recording magnet means, mechanism engageable with the platen to cause intermittent relative movement between said recording magnet means and surface, a circuit for energizing the recording magnet means to magnetize selected areas of said surface according to said representation, reading magnet means movable relative to said surface intermittently and independently of the recording magnet means for sensing the magnetized areas, and erasing magnet means fixed to the reading magnet means and spaced therefrom by an amount corresponding to an intermittent movement.

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