United States Patent

Murata et al.

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[54] FEED CONTROL DEVICE FOR A PHOTOGRAPHIC TYPESETTER

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[73] Assignee: **Minolta Camera Kabushiki Kaisha**

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[58] **Field of Search**.....235/92, 150.3, 151.1, 151.22, 235/160, 164, 177; 318/571, 601, 603; 328/38, 41–42, 48, 160; 340/146.2; 95/4.5

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[57] **ABSTRACT**

First and second comparing circuits each include respective first and second counter circuits wherein pulses generated by a pulse generator are initially compared by the first comparator with a stored number representing the width of a character to be photographed. In response to an output from the first comparator indicating coincidence with the stored number therein, the second comparator counts pulses from the pulse generator until coincidence with a stored digital factor representing the type size of the character to be photographed. An output signal from the second comparator is fed back to stop the pulse generating device.

2 Claims, 2 Drawing Figures

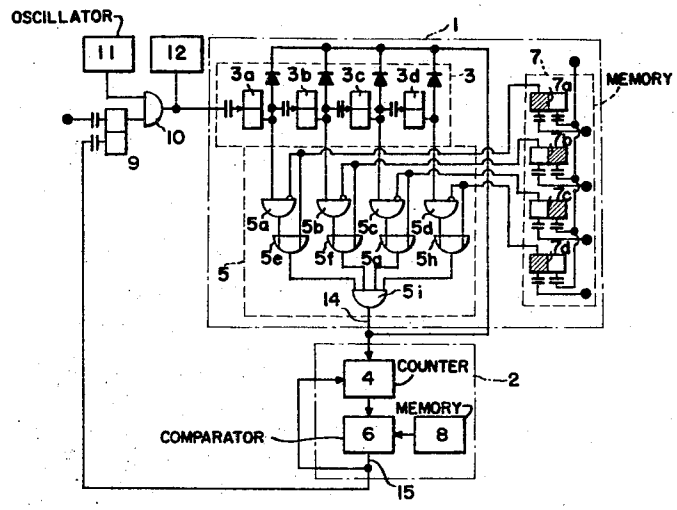


FIG. 1

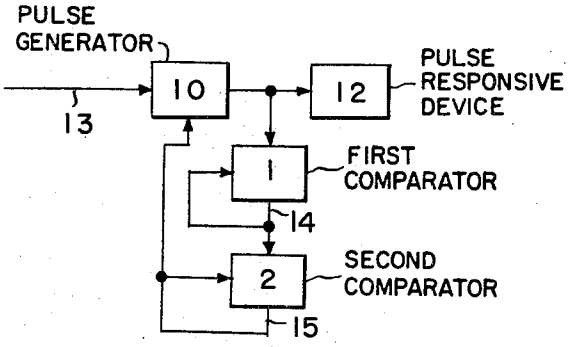
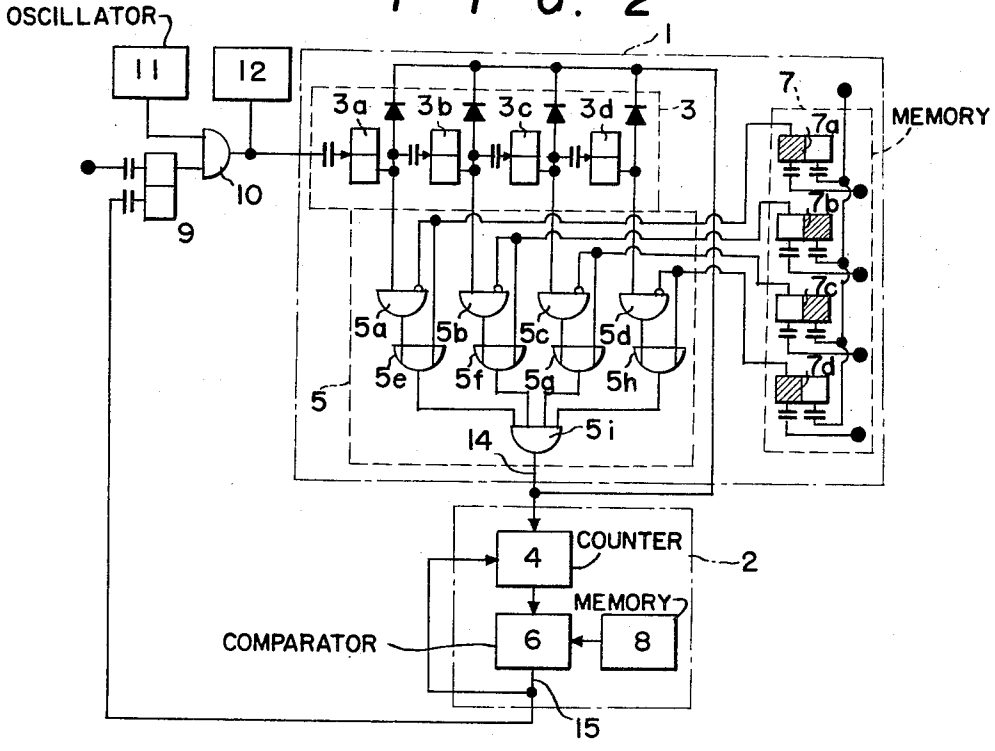


FIG. 2



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FEED CONTROL DEVICE FOR A PHOTOGRAPHIC TYPESETTER

BACKGROUND OF THE INVENTION

The present invention relates to a feed control device for a photographic typesetter, which composes characters such as alphabetical letters and the like wherein the character widths are different from each other in the identical type series.

Because characters have different widths and if the characters are assigned respective widths, the typesetting of broad characters results in narrow intercharacter spacing and, conversely, the typesetting of narrow characters causes wide intercharacter spacing, thereby producing poor composition.

Therefore, in accordance with the width of every character, it is necessary to change the respective character feed width in the photographic typesetter. That is, in accordance with the width of every character, it is necessary to change the incremental feeding of the photosensitive paper for every character or change the typesetting position for every character.

Besides, the photographic typesetter has, by changing the magnification, the advantage of changing the size of the character in a type series with ease, however, it is necessary to change the feed width therefor.

In this connection, in the prior feeding devices for photographic typesetter, the mechanism for changing the feed magnification by replacing the feed gear is used, therefore, the typesetting of successive characters is not carried out by one set of feed gears, and when various composite type fronts are mixed, even though the feed gear is changed, the gears often do not mesh, so that the feed slips and the character composition is irregular. Also, it takes a long time for changing the feed gears.

SUMMARY OF THE INVENTION

The primary feature of the present invention is that a feed control device is responsive to a pulse device which is controlled by the product of the pulse number corresponding to a respective character width in the identical type series and the pulse number given to the size of the character in the type series.

The second feature of the present invention is that a feed control device is operated by a pulse feeding device controlled by means of a pulse supply device, and a pulse responding device is driven by the pulse supply device. A first comparing device for the character width counts of the pulses from the pulse supply device and collates the pulse number counted with a stored pulse number, and a second comparing device for a multiple of the type series counts the output pulses collated by the first comparing device and collates the output pulse number counted with a stored pulse number; and thus effects the proper feed corresponding to the character width for the particular size type.

A primary object of the present invention is to provide improved apparatus for controlling a photographic typesetter by automatically determining control signals for the film feeding means in accordance with the type size of the character selection.

The other objects of the present invention will be apparent from the detailed description disclosed hereinafter.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block diagram of the present invention.

FIG. 2 is a logical circuit diagram showing the construction of an embodiment in accordance with the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The feed for every type-setting character in the present invention is carried out by a pulse responding device such as a pulse generator and the like, and the pulse number given to the pulse responding device is fixed for every character and controlled by the selection of a character. Changing of the type size number is carried out by controlling the coefficient multiplied by the pulse number of a respective character.

That is, in order to feed one character the pulse number given to a pulse responding device is as follows:

(The pulse number of a respective character) x (the coefficient related to the type size number)

In FIG. 1, numeral 12 denotes a pulse responding device and 10 a pulse supply device. Pulse supply device 10 may be a pulse generator or a gate for controlling the passing of pulses provided by another pulse generator.

When a start signal shown by arrow 13 is fed to the pulse supply device, a pulse is fed therefrom to pulse responding device 12. At the same time pulse is fed to first comparing device 1.

In first comparing device 1 the pulse number corresponding to the character width of a character selected to be composed is stored and counts the pulses fed from pulse supply device 10. When the pulse number counted coincides with the pulse number stored, the output signal 14 is fed to second comparing device 2 and at the same time resets the first comparing device.

In the second comparing device the coefficient is stored corresponding to the type size number of a character to be composed and by selecting the type size number the stored coefficient corresponding thereto is set up, and the output signal 14 from first comparing device 1 is counted.

Further, first comparing device 1 is reset by the output signal 14 to start counting again the pulses from pulse supply device 10, and when the pulses counted coincide with the pulse number stored corresponding to the character width the output signal 14 is fed again to second comparing device 2 and the number thereof is counted. And, when the number counted coincides with the stored coefficient corresponding to the type size number stop signal 15 is issued and is fed to pulse supply device 10 to stop the pulses from pulse supply device 10, and accordingly pulse responding device 12 is stopped and the feeding of characters is stopped as well.

Now, for example, comparing the character "W" with the character "i," the ratio of their widths is 20 : 4, and provided that this ratio is taken as a standard the ratios of the character widths of the other characters are all substantially an integral number. And the coefficient n corresponding to the type size number is applied, for example, when five-point type is composed, the respective pulse numbers $20 \times 5 = 100$ for "W" and $4 \times 5 = 20$ for "i" are supplied to the pulse responding device.

FIG. 2 shows the logical circuit of an embodiment of the present invention, wherein pulse supply device 10 is composed of a gate circuit to which pulses are fed from pulse source 11. Start signal 13 is fed to gate circuit 10 through flip-flop circuit 9.

Now, when start signal 13 is fed to flip-flop signal 9, gate circuit 10 becomes conductive, and the pulse fed from pulse source 11 passes through inhibit circuit 10 and is fed to pulse responding device 12 composed of a pulse generator and first comparing device 1 enclosed by a broken line in FIG. 2.

First comparing device 1 is composed of pulse counter 3 enclosed by a dotted line, coincidence circuit 5, and memory device 7.

Coincidence circuit 5 is provided with four inhibit circuits 5*a*, 5*b*, 5*c*, and 5*d*, and connected respectively to flip-flop circuits 3*a*, 3*b*, 3*c*, and 3*d* composed of four stages forming respective elements of pulse counter 3. And, flip-flop circuit 3*a* is reversed every pulse, flip-flop circuit 3*b* is reversed every two pulses, flip-flop circuit 3*c* is reversed every four pulses, and flip-flop circuit 3*d* is reversed every eight pulses. Inhibit circuits 5*a* to 5*d* are connected respectively to Or-circuits 5*e*, 5*f*, 5*g*, and 5*h* and the outputs thereof are fed respectively to one final-and circuit 5*i*.

Memory device 7 is provided with memory elements 7*a*, 7*b*, 7*c*, and 7*d* composed, in the same way, of a four stage flip-flop circuit, and these memory elements 7*a* to 7*d* respectively store the number corresponding to the character width of a selected character . On-Off signals for the memory are fed respectively to inhibit circuits 5*a* to 5*d* and Or-circuits 5*e* to 5*h* through every channel.

And, final-AND circuit *5i* issues output signal **14** when the number in counter **3** coincides with the stored number corresponding to the character width of a character stored in memory device **7**. Signal **14** is fed to second comparing device **2** and at the same time, resets each of counter elements *3a* to *3d*. In the embodiment shown in FIG. **2**, the signal from AND circuit *5i* which resets counter elements *3a* to *3d* may be inverted, as is well known to those skilled in the art.

Second comparing device **2** is composed of counter **4**, coincidence circuit **6**, and memory circuit **8**, and provided with the same formation respectively as counter **3**, coincidence circuit **5**, and memory device **7** in the first comparing device **1** (not shown in the drawings).

Second comparing device **2** counts the output signal **14** from final-AND circuit *5i* in first comparing device **1**, and when signal **14** coincides with the magnification coefficient set up and stored in memory device **8**, stop signal **15** is issued from the final-and circuit (not shown in FIGS.) in coincidence circuit **6**. Stop signal **15** resets counter **4** and at the same time it is fed to flip-flop circuit **9** to reverse it and switch gate circuit **10** to a conductive state so as to stop the pulse fed from pulse source **11** and stop pulse generator **12**.

Those skilled in the art will recognize that the polarity of stop signal **15** from the final - AND circuit (not shown) is inverted so as to reset the counter elements of counter **4**.

Now, for example, assuming the stored number corresponding to the character width in memory device **7** is "6", in memory device **7** the complement of the number is stored, so that memory device **7** is set so that the outputs of memory elements *7a*, *7d* are "1" and the outputs of *7b*, *7c* are "0." Therefore, OR-circuits *5e*, *5h* have a "1" output from memory element *7a*, *7d*. Further, assuming the output of each of counter elements *3a* to *3d* is all "0" and accordingly the outputs of inhibit circuits *5b*, *5c* are "0," therefore, the outputs of OR-circuits *5f*, *5g* are "0," and the output of final-AND circuit *5i* is "0" because all of the inputs are not "1."

When six pulses are supplied to counter device **3** through gate **10** the outputs of counter elements *3a*, *3d* are "0" and the outputs of *3b*, *3c* are "1," and the outputs of inhibit circuits *5b*, *5c* are "1" and accordingly the outputs of or-circuits *5f*, *5g* are "1." Final-and circuit *5i* issues output signal **14** because all of the inputs are "1." This output signal **14** is fed to counter **4** and at the same time resets counter device **3**. Final-AND circuit *5i* issues output signal **14**.

Now, provided that memory device **8** of second comparing device **2** has stored magnification coefficient **2**, the output signal **14** is counted by counter **4** in second comparing device **2** and at the same time because of output signal **14** counter **3** in first comparing device **1** is reset. When six pulses are counted by the same operation the output signal **14** is issued. Because of that output signal second comparing device **2** issues stop signal **15** and flip-flop circuit **9** is reversed to close gate circuit **10**, and accordingly, feeding of the pulses is stopped. Therefore, the pulse number passed is $6 \times 2 = 12$, and pulse generator **12** is driven by that many pulses so that the proper feed can be effected.

In this case, it is also possible to arrange the first comparing device to store the type size number and the second comparing device to store the feed pulse number corresponding to the character width.

Besides, in the present invention, when composing types of a large size number (type point number) the magnification coefficient stored by memory device **8** in second comparing device **2** becomes larger and repeated operations of first comparing device **1** are required. Accordingly, the operation becomes slow, however, in such a case by using a gear change over means it is possible to make up the speed loss. That is, for example, if by means of the gear change over means the feed multiple is changed to be three times, the feed for typesetting of a portion of $3n$ points can be effected by n pulses, and the feed for typesetting of $3n$ points can be effected at the same speed as the feed for typesetting of n points. Also in this case a gear mesh mismatch results, however, the feed width is extremely large so that the disturbance due to it is small.

In the above disclosed embodiments the memory circuit and the comparing circuit operate by complementary logic; however, those skilled in the art will recognize that the apparatus may be modified to provide operation with non-complementary logic.

We claim:

1. An automatic feed control device for a photographic typesetter comprising:

pulse generating means for generating pulses in response to an input signal;

pulse responsive means for receiving said generated pulses;

film feeding means controlled in accordance with the number of pulses received by said pulse responsive means for feeding a film;

first comparing means including a first counter circuit for counting said generated pulses;

first memory means for storing a digital number corresponding to the width of a character to be photographed, a first coincidence detector for generating an output signal when the number of pulses in said first counter circuit and stored pulses in said memory means coincide to reset said first counter circuit;

second comparing means including a second counter circuit for counting said generated signals from said first comparing means, second memory means for storing a digital factor representative of the type size to be photographed, and a second coincidence detector for generating an output signal when the number of pulses in said second counter circuit and stored pulses in said second memory device coincide to reset said second counter circuit; and

means for feeding back said generated output signal from said second comparing means to said pulse generating device and for stopping said pulse generating device.

2. A feed control device as set forth in claim **1**, wherein said pulse generating means includes a pulse source, a gate circuit interposed between said pulse source and said first comparing device and for gating the pulses from said pulse source, and a flip-flop circuit for controlling said gate circuit; and said flip-flop circuit is switched by said second output signal.

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