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TYPE MEMBERS FOR A HIGH SPEED PRINTER

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2 Sheets-Sheet 2

Fig. 3

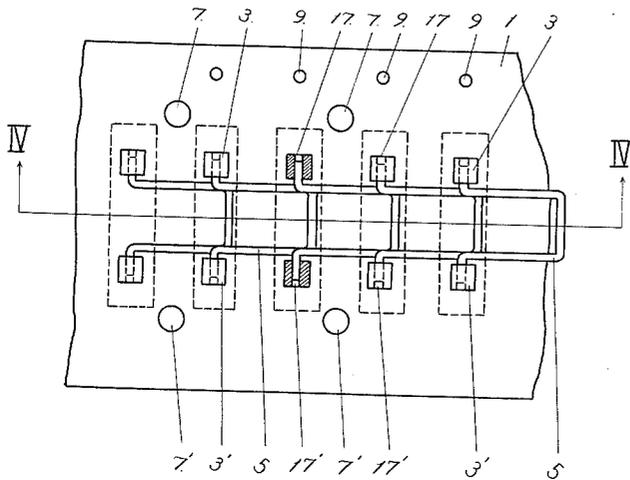
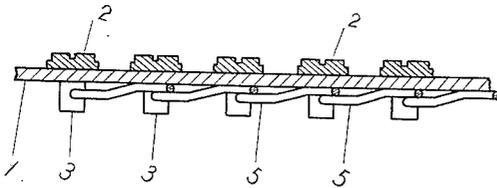


Fig. 4



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TYPE MEMBERS FOR A HIGH SPEED PRINTER

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1 Claim. (Cl. 101-111)

This invention relates to type members for a high speed printer for printing information issuing from an electric computer.

The conventional printer prints the letters or other characters consecutively along the line of type and the speed of printing is accordingly lower than is desirable.

The present invention is concerned with a high speed printer for an electronic computer whereby information corresponding to a line of type can be printed under the control of an electric computer and memory device, the printer being of the kind equipped with a number of hammers and magnets corresponding to the number of types in a line, the hammer striking to make the printed impression on the paper. The type has rotary movement and printing can be effected by operating these hammers and magnets by synchronizing signals which are coordinated to the speed of rotation of the types. These printers can print a line by one rotation of the type wheel; the so-called "flying type or print system."

The printing mechanism of the flying type system at present in use is either a multiple type wheel system or a single type wheel system.

Each type wheel employed in the former has limited numbers and kinds of types, a wheel is provided at each printing point along the line of printing and one line of printing can be made by one rotation of the wheels. Its structure is such however that if more numbers and kinds of types are required, the wheels must be replaced and the total number of types is presented by the following equation: Numbers of types in a line \times kinds of types.

Therefore, the number of types required may be very high. In the alternative case, the type hammers are equipped as a cylindrical system and the paper to be printed must be brought into cylindrical form and this complicates feeding of the paper. Moreover, if a greater number of types in a line is required, the type wheel becomes large and introduces space difficulties and centrifugal force may also have an undesirable influence.

According to this invention, the types are held, preferably detached, on an endless belt, band or the like (hereinafter termed "belt") which is preferably of metal and advantageously of thin steel plate or strip. The belt may have light-transmitting slots or apertures for synchronizing the respective types with the computer and through which synchronizing pulses are made to indicate the relative position between the hammers and the types on the belt.

The improved printer allows the paper to be kept flat during printing. The total number of type pieces required is small and in the preferred form of the printer replacement of type pieces can be easily achieved and there is nevertheless little or no risk of pieces being sheared off during operation. It is also found that the synchronizing error between the movement of the type and the synchronizing signals can be reduced or eliminated by the improved printer.

The type members of the invention are designed each with a pair of rearwardly extending lugs passing through apertures in the belt. The lugs are pierced to receive wire loops extending from one lug to the other behind the belt and these loops have a medial portion so designed that it may be extended across the gap between types and en-

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gage the open wire loop end of the next adjacent type. Thus each type interconnects with and reinforces the fastening of the next adjacent type member on the belt.

In order that the invention may be the more readily understood, reference is hereinafter made to the accompanying drawings which show embodiments of a printer having type means according to the invention.

FIG. 1 is a diagrammatic general view of the printer; FIG. 2(A) is an enlarged sectional view of FIG. 1 on the line II—II of FIG. 1;

FIG. 2(B) shows a similar sectional view of a modification in which a reinforcing layer is applied to the rear side of the type belt;

FIG. 3 is a further-enlarged rear view of the types fixed to the belt as shown in FIG. 2; and

FIG. 4 is a sectional view of FIG. 3 on line IV—IV of FIG. 3.

Now, referring to FIG. 1, the type pieces 2 are shown as applied to the endless belt 1 at equal intervals from one another in a single row, although there may be a plurality of rows of types.

As shown in FIG. 2(A), fixing lugs 3 and 3' are provided at the back of the type piece 2 and these lugs 3, 3' are inserted through holes 4, 4' in the endless belt 1, and are fixed by a wire spring 5, permitting detachment and re-attachment.

The endless belt to which the type pieces 2 are so fixed, is driven by rotation drums 6, 6' having projections 8, 8' engaging holes 7, 7' along both margins of the belt for sprocket drive, the drums being driven by a motor M through gearing as shown. The surfaces of the drums 6, 6' are shaped, e.g., grooved to accommodate the lugs 3, 3' and springs 5.

Apertures 9 for synchronizing signals are provided in the belt in the position corresponding to type pieces 2.

A photo-transistor 11 receives light from a lamp 10 through the apertures 9, and permits synchronizing of the relative positions between the apertures and type pieces by synchronizing pulses, and synchronizing pulses can also be obtained through apertures 9 on the circumference of a disc, corresponding to the respective types, which is fixed to the shaft of the motor.

But with types directly on belt 1, it is not necessary to adjust the synchronizing position between type pieces and apertures, even if the intervals between the type pieces are not equal. If belt 1 is put on a cylindrical surface or other shape, synchronizing pulses are easily obtained.

A number of hammers 13 is provided corresponding to the number of type pieces 2, for example as many as the number of characters which are to be printed in a line, and they are operated by magnets.

The paper 15 to be printed is inserted between the belt 1 and the hammers 13 in front of an ink ribbon 16. The input signals are recorded and memorized beforehand by the customary discrimination circuit 12 and when a type piece 2 to be printed reaches the position to print, the hammer corresponding to that type is operated through the synchronizing pulse control. In association with a memory device, synchronizing signals, the type pieces, and the hammers, a printing to which corresponding wheel input signal can be performed.

For instance, in the special case that type "A" is to be printed in a line, when type "A" on the belt is passing each appropriate hammer, it is worked consecutively by synchronizing pulses and thus the printing of "A" on the paper can be made. On the other hand, characters of the type pieces on the belt can be produced by simultaneous working of the hammers when different types come to position in the line.

In this way, printing in a line can be done by one rotation of the endless belt.

The synchronizing aperture in the belt which correspond

to the arrangement of the type pieces on the belt, are recorded by the photo-transistor and the synchronizing pulses that emerge from the photo-transistor and the relative position of the types and the hammers is indicated and the discrimination circuit operated.

As shown in FIG. 2(A), the engagement of the endless belt 1 with the rotation drums 6, 6' and the high speed rotation, may give rise to noisy operation and reduce the life of the belt and possibly crack or splinter the belt. As shown in FIG. 2(B), a layer of nylon or rubber may be applied, e.g., stuck on the rear side of the belt to reduce these effects.

It will be noted that the paper is kept flat during printing and only a small number of types is necessary so that the high speed rotation of the endless belt is promoted.

The space between rotation drums 6 and 6' can be determined according to the width of paper to be printed, or the length of the printing line to be printed on it.

To promote a more stable fixing of the type pieces to the belt, the type members of the invention shown in FIGS. 2, 3, and 4 may be employed. The lugs 3, 3' are passed through the holes 4, 5' on the endless belt and the ends of the wire springs 5, shaped as shown, are inserted in holes 17, 17' in the lugs 3, 3' and the medial looped part of the wire spring is made to fix the types tightly to the rear side of the belt by the engagement of the medial looped portion of one spring within the open loop end of the adjacent wire spring. FIGS. 3 and 4 best show this interlocking arrangement.

What is claimed is:

In combination with a type-carrying belt for use in a

high speed printer of the kind described, type members having faces carrying print and having a pair of rearwardly extending lugs passing through apertures in said belt, said type members being arranged along said belt in linear spaced relationship, holes formed in said lugs, and spring means for each type consisting of an individual wire loop for each type member, each end being engaged in the holes formed in each pair of lug, the medial part of the loop of wire being formed to extend to and engage within the open loop end of the wire loop carried by an adjacent type member.

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