

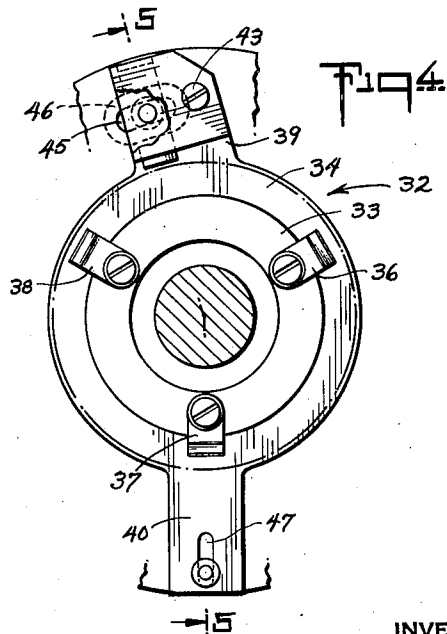
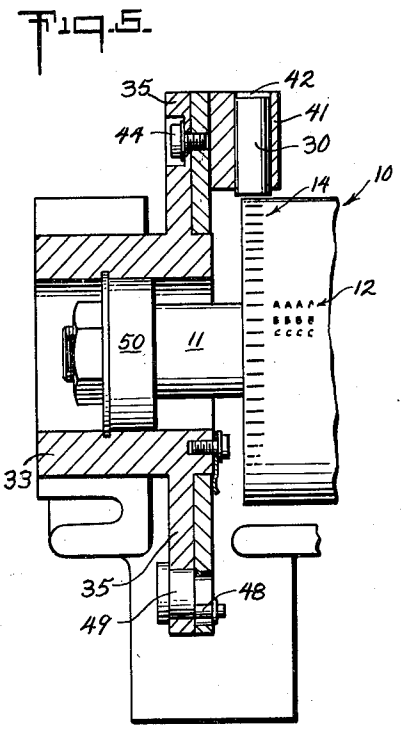
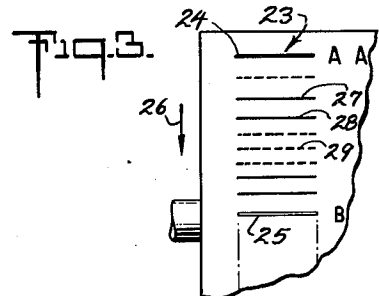
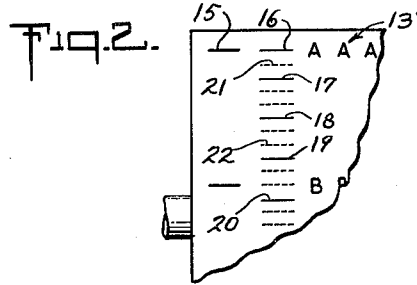
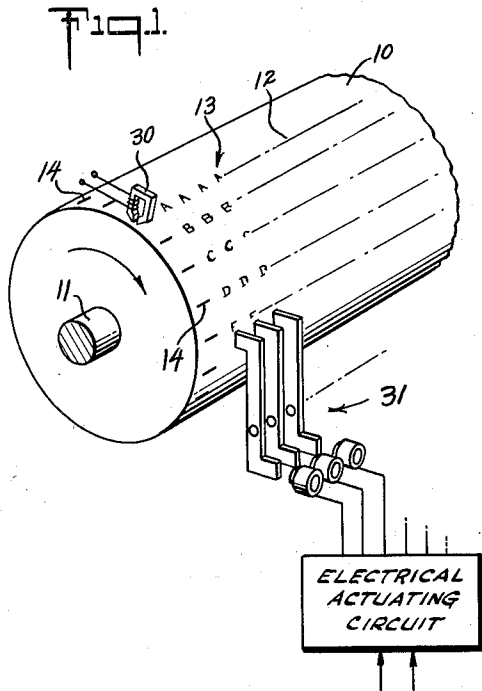
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3,259,059

HIGH SPEED PRINTER TYPE DRUM

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3,259,059

HIGH SPEED PRINTER TYPE DRUM

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5 Claims. (Cl. 101-93)

This invention, generally, relates to high speed printers and, more particularly, to a new and improved type drum for such printers.

Early type drums as used in printer apparatus were assembled from stellate typing slugs which were arranged radially, one or more slugs for each line of characters. More recently, type drums have been manufactured with the type characters formed on the surface of a single cylinder of steel, such drums being formed, for example, by a coining process sometimes supplemented by a prior rough forming.

With a type drum as heretofore known, it is required to utilize one or more timing discs which generally consist of a series of slots cut in the disc, the disc being attached to the shaft of the type drum and sensed by a reluctance pick-off transducer. The disc must be adjusted rotationally with a high degree of precision relative to the type drum so that a timing pulse is produced for each new line of characters on the drum as the line comes into position for printing. The disadvantages inherent in the use of timing discs are related principally to the extra complexity in the manufacturing and the necessity for holding very close tolerances both in the format of the characters on the drum and in the location of the timing disc relative to the type drum.

Accordingly, it is a principal object of the invention to provide a new and improved type drum for a high speed printer.

It is also an object of the invention to provide a high speed printer type drum which admits of greater ease in manufacturing and adjustment in operation.

The type drum of the invention is uniquely adapted for use in a high speed printer apparatus, the drum including a plurality of type characters arranged in a predetermined pattern on the surface of the drum, and character identifying indicia being arranged in a predetermined pattern on the drum in contiguous relationship with the type characters.

Other objects and advantages of the invention will become more apparent in view of the following detailed description of one preferred embodiment thereof, when taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a partial view in perspective of a type drum constructed in accordance with the principles of the invention;

FIG. 2 is a fragmentary view of a type drum which includes a code indicia different from that shown in FIG. 1;

FIG. 3 is a view similar to FIG. 2 but showing a different position-identifying indicia code from that shown in FIG. 2;

FIG. 4 is an end view of an adjustable transducer support device; and

FIG. 5 is a sectional view taken along the line 5-5 in FIG. 4.

Referring now to FIG. 1 of the drawings, the numeral 10 identifies the type drum generally in accordance with the invention, which is of a single, unitary construction. The drum 10 is adapted for rotation about a shaft 11 to present type characters sequentially to a plurality of hammers 31 which define a print line parallel to the axis of the drum 10.

The particular type characters shown in the drawings are letters of the alphabet, A, B, C, . . . , etc., and these

type characters usually are combined with numerals and others characters of any desired code. It is customary, depending upon the particular logic of the system associated with the printer apparatus, to arrange for the same type character in each position along a horizontal line, identified by the numeral 12. For example, along the line 12, the letter A is repeated for each hammer position so that an A is printed in those positions corresponding to the hammers which are actuated.

In accordance with the invention, a position-identifying indicia or code is positioned directly on the type drum 10 in a predetermined relationship with the print type 13, and this code is identified generally by the numeral 14 in FIG. 1.

While the code 14 may be positioned in any desired manner relative to the print type 13 which it identifies, it is shown in FIG. 1 as being positioned substantially along the same corresponding line 12 relative to the print type 13. The code 14, in the instance shown, includes a plurality of bars formed in the same manner and at the same time as the print type 13. The bars 14 will react with a suitably placed transducer 30 to provide a position-identifying pulse each time a row of printed characters or print type is in position for printing.

Of course, it will be understood readily that any desired code may be adopted, it being required only that, in accordance with the invention, the code be located directly on the same print drum as the type characters and in a predetermined relationship with the type characters. In FIG. 2, for example, the type characters are indicated by the numeral 13' showing that they are comparative with those shown in FIG. 1. The code, however, is made up of two separate channels or tracks identified generally by the numerals 15 and 16, respectively, formed directly on the same drum as the type character 13'.

The track 15 includes code bars located at each rotational position in which a line of print characters is formed, and since these code bars are regularly occurring at this position, they may be referred to as clock pulses.

The code in track 16 is used to identify the particular print characters appearing in the position 13', and this is accomplished by arranging bars 17, 18, 19 and 20 in predetermined positions between the clock pulses in the track 15. Spaces 21, 22, etc., indicate positions at which a code bar such as 17, 18, etc., may be located if desired, depending upon the code adopted.

FIG. 3 shows a different form of code, although the principle of the invention, which is to have the code on the same drum as the type print, is the same as that in FIGS. 1 and 2. However, the code in FIG. 3, identified generally by the numeral 23, depends upon some particular characteristic of the code, for example, the clock pulses 24 and 25 are formed of a different width, rotationally, as measured in the direction of the arrow 26, as compared with the thickness of the lines 27, 28, etc. As with the code shown in FIG. 2, the positions indicated by the lines 29 are blank, but may be used if a different code is adopted.

While any suitable device may be used to support the transducer 30, FIG. 4 shows a presently preferred form of a transducer support means which permits the transducer 30 to be positioned adjustably relative to the printing hammers 31. The transducer support device is indicated generally by the numeral 32 and includes an annular section 33 which is part of the usual printer housing. A ring 34 is slideably fitted over the annular section 33 and is held snugly against a circumferential flange 35, better seen in FIG. 5. The flange 35 is fixedly attached to, or is an integral part of, the housing section 33. The ring 34 is retained in position by three spring clips 36, 37 and 38, each of which is attached at one end by a suitable screw to the housing section 33 so that

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its opposite end bears against the ring 34. In this manner, the ring 34 may be slideably adjusted in an arcuate manner about the annular section 33.

The ring 34 has two arms 39 and 40 extending radially out from the outer edge of the ring 34. The arm 39 has fixedly attached to it a housing 41 having a cavity 42 for receiving a transducer 30. A screw 43 retains the transducer 30 within the cavity 42 so that it is maintained a desired distance spaced from the position-identifying code 14, best seen in FIG. 5.

Another screw 44 fits loosely through an arcuate slot 45 in the flange 35, and a larger arcuate slot 46 permits the head of the screw 44 freedom for moving arcuately. The screw 44 is threaded into an opening in the arm 39, so that by tightening the screw 44, the arm 39, and therefore the ring 34, is securely fixed in that particular rotational position against the flange 35.

The arm 40 has an elongated slot 47 extending radially along the axis of the arm 40 to receive a pin 48 which extends from an offset position relative to the axis of a cam screw 49. Therefore, it may be seen that by loosening the locking screw 44 and by rotating the cam screw 49, the transducer 30 may be adjusted in position circumferentially about the drum 10, and when in a desired position, the locking screw 44 is tightened to maintain that position.

As also seen in FIG. 5, the shaft 11 of the drum 10 is supported in a suitable bearing 50 mounted in the housing section 33.

By an arrangement in accordance with the invention, the position-identifying code 14 is formed in an extremely accurate manner at the same time as the type characters are formed on the drum surface. The transducer 30, therefore, will detect a position-identifying code 14 when the associated row or line of type characters are in an exact arcuate distance from the print line defined by the printing hammers 31 regardless of any other irregularities in spacing that may exist between other rows of characters. For example, the spacing between the row of A's and the row of B's may be different from the spacing between the row of B's and the row of C's. Formation of type characters on the drum with such a high degree of accuracy in the arcuate or angular spacing between rows of type characters is no longer required with an arrangement in accordance with the present invention because a row of type characters is sensed only when its associated position-identifying code is sensed and each position-identifying code has precisely the same angular position relative to the type character line or row associated therewith. Therefore, the transducer 30 will detect a position-identifying code 14 each time the associated type character row or line reaches an exact arcuate or angular distance from the print line as explained above.

Heretofore, separate discs have been necessary because it has not been feasible before this to vary the position between the transducer 30 and the hammer 31. This required that position-identifying codes formed on separate discs must be spaced with the same degree of accuracy as the spacing between rows of type characters on the drum. Then, the separate discs must be adjusted rotationally on the drum shaft to achieve a desired advance signal to compensate for the hammer firing time.

By shifting the position of the transducer 30 in accordance with the present invention, the exact timing between sensing of the code and impact of the hammer may be adjusted even while the drum is rotating.

While any suitable means may be used to develop the type characters and the code on the drum, one satisfactory means includes the use of a drum of steel, magnesium or plastic, and contemplates the preparation of a photographic negative of the developed surface of the drum. This negative shows all of the type characters which are to be generated on the drum surface and shows the position-identifying indicia in accordance with a predeter-

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mined code positioned in a predetermined relationship with the characters.

The negative then is wrapped around the drum which has been previously sensitized, and an exposure is made. This is followed by a developing and fixing process which results in an etched surface with the characters and code raised and the background removed.

Of course, a drum may be formed of a heavy material to obtain the benefits of rotational inertia and a plastic sheet, such as a plastic made by DuPont under the trade name of "Dykril," is wrapped around the drum and secured to it with a cement such as epoxy. Then, the surface is exposed as mentioned above. The development of this plastic surface is achieved by spraying with a very weak base solution.

Therefore, it may be seen that if the entire negative is on a background which expands and contracts uniformly with the temperature and humidity, the only requirement is on the initial relative location between the code and the characters, which is considerably easier to hold than the previous arrangement of the code on a separate disc.

It is contemplated that in wrapping the negative around the drum, the negative will not overlap and, in fact, a space is provided between the meeting ends or edges and this space is utilized to generate an original pulse.

While any suitable transducer means may be used to sense the code or position-identifying indicia, one satisfactory method is an optical system utilizing a lamp and lens to illuminate the marks and a lens system with a photoelectric pick-up which senses the marks. The relative magnitude of the signal can, of course, be improved by filling the background with a non-reflecting material and/or using a highly-reflective material on the raised portion of the marks or any similar combination.

Other methods of sensing, such as a reluctance pickoff, will work for a similar system providing suitable material is used for the drum, such as iron.

An inherent advantage in putting the code on the same drum as the type characters in addition to the timing track is that it simplifies the electronic logic circuitry that must be used with the printer apparatus.

Obviously, modifications of the invention are possible in the light of the description above, and it is contemplated that the scope of the invention is determined by the appended claims.

What is claimed is:

1. In a high speed drum printer apparatus, an array of hammers arranged along a print line parallel to the axis of the drum, an electrical circuit for actuating said hammers responsive to a combination of information input signals from a source external to the printer and timing signals representative of a line of type characters available for printing, a print drum supporting the type characters for striking by said hammers, said drum comprising a plurality of type characters arranged on the surface of said drum in a plurality of angularly spaced lines with each of said lines having identical type characters and being parallel to the axis of said drum so that the type characters on each line arrive at said print line simultaneously, and separate character-identifying means arranged on the surface of said drum adjacent to one end of each of said type character lines with each of said character-identifying means having precisely the same angular position relative to the type character line associated therewith so that the angular spacing between adjacent character-identifying means is the same as the angular spacing between the type character lines associated therewith even though the angular spacing between the type character lines may differ slightly, and

means to adjustably support a transducer in sensing relationship with said character-identifying means in advance of said print line to enable the precise angular position of the transducer relative to said print line to be adjusted while said drum is rotating, whereby said character-identifying means corresponding to the lines having characters to be printed will produce a timing signal cooperating with said electrical circuit signals for actuating the hammers to print the type characters at said print line.

2. The printer apparatus as defined in claim 1 wherein said drum comprises a substantially cylindrical surface with said type characters and character-identifying means formed in said surface in the same manner.

3. The printer apparatus as defined in claim 1 wherein said character-identifying means comprises a predetermined code which provides a unique signal indicative of the type character line associated therewith.

4. The printer apparatus as defined in claim 3 wherein said code is arranged in at least one track extending peripherally about said drum.

5. The printer apparatus as defined in claim 3 wherein said code is arranged in at least two tracks, one track being adapted to include first information indicative code and the other track being adapted to contain second information indicative code different from said first code.

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