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2,787,952

HIGH-SPEED PRINTER APPARATUS

Filed April 29, 1955

2 Sheets-Sheet 1

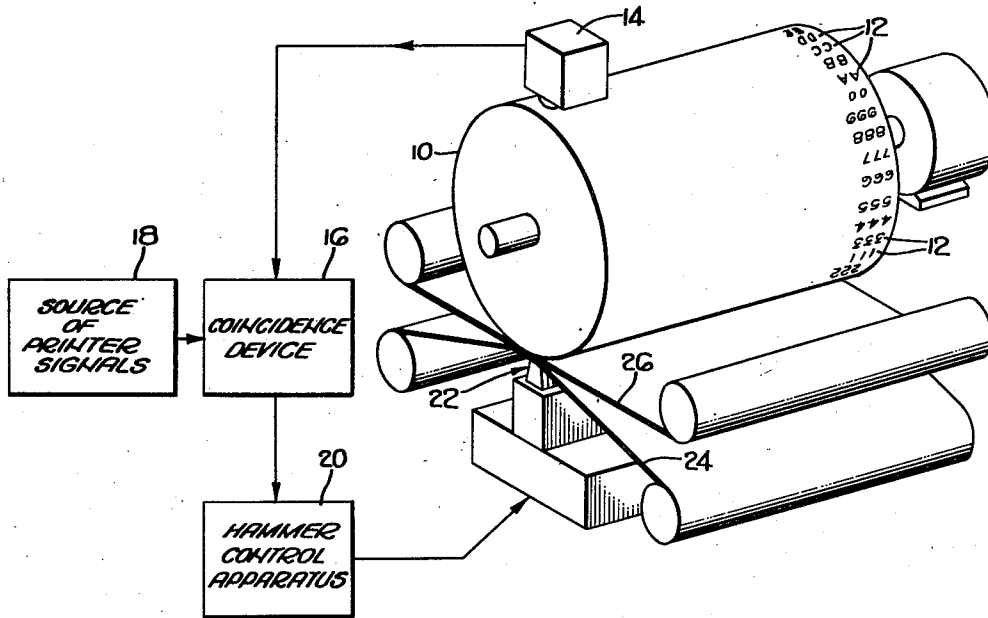


FIG. 1.

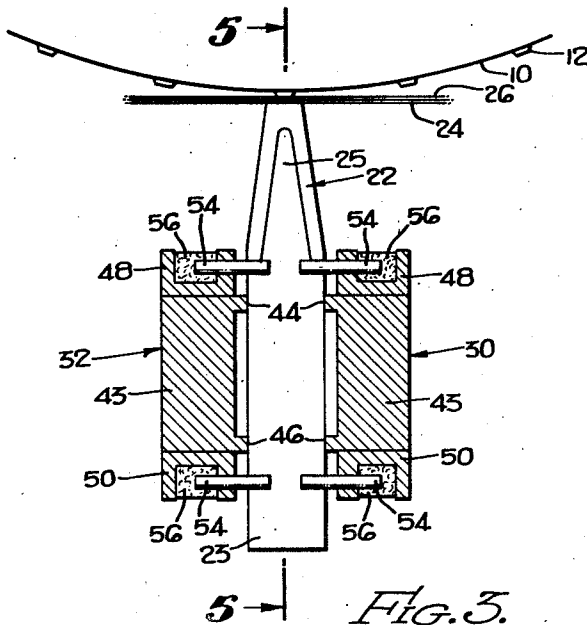


FIG. 3.

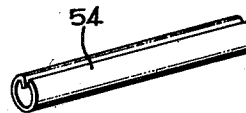


FIG. 4.

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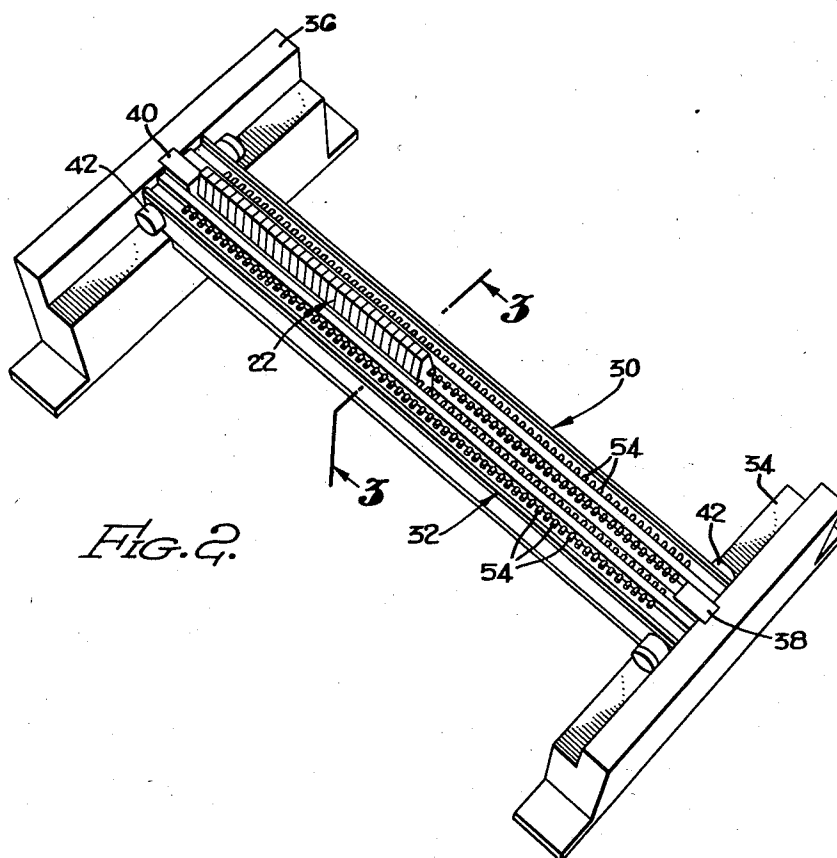


FIG. 2.

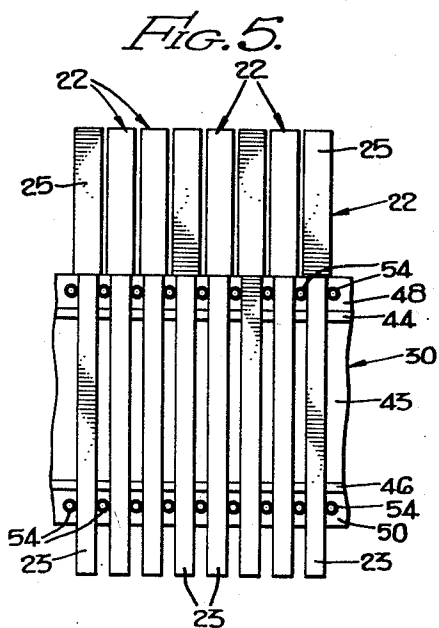


FIG. 6.

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HIGH-SPEED PRINTER APPARATUS

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3 Claims. (Cl. 101—93)

This invention relates to high-speed printers and, more particularly, to improvements therein.

There are presently commercially purchasable high-speed printers of a type in which a drum carries type on its periphery for the various letters, numbers and other symbols to be printed. The type is secured to the drum periphery as axially extending columns. Each axial column contains the same type letter or number. Opposite each column at one end of the drum are markings, usually magnetic, which can be used to identify when a particular letter is opposite the printing position. Thus, if 26 letters and 10 numbers are all that is required, the drum will have 36 columns of type and appropriate marks at one edge to signify when a particular letter or number is opposite the printing position.

Paper which is to be printed upon, together with an inked ribbon, are passed through the printing position which may be at the bottom of the drum. A column of individually moveable hammers are employed which are selectively actuated to press the paper against the ribbon and type character at the printing position. These hammers usually extend in a column parallel to the columns of type on the drum. There are as many hammers in a column as there are type characters in a column. These hammers are usually individually actuated by solenoids which rapidly move them selectively as the drum rotates. Electronic apparatus is employed to control the operation of the hammers.

The hammers must move at a very high-speed for obtaining high printing speeds. The presently known method for mounting these hammers is to place them between two guide bars. The guide bars are made with a plurality of notches and are spaced opposite each other to accommodate the substantially elongated rectangular metal hammers inserted between notches. The guide bar structure extends for an appreciable part of the length of the hammer bar. The assembly is usually held so that each hammer bar is moved vertically by the thrust of the solenoid and falls back into position due to the pull of gravity. In high-speed printers which attain printing speeds of 600 characters per minute, the hammers and guide bars require very frequent replacement because of the wear due to friction with the guide bars. Furthermore, very precise machining of the guide bars is necessary to insure that the hammers are properly aligned and guided to strike the paper against a selected type character on the moving drum.

An object of the present invention is to provide a hammer-guiding structure which minimizes frictional wear between hammer and guide structure.

Another object of the present invention is to provide an improved guide bar structure which lasts longer than any of those employed heretofore.

Still another object of the present invention is to provide a new and improved guide bar structure for hammers which is simpler to construct than those employed heretofore.

These and other objects of the invention are achieved

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by providing a hammer guiding structure wherein the contact area between hammer and guide structure is considerably reduced and a means is provided for lubrication of the wearing surface of a hammer. A hammer is guided on each of two opposite faces by two flat land portions of a guide bar central member and on each of the other two opposite faces by spacer pins.

The features of the invention which are believed to be new are set forth with particularity in the appended claims. The invention itself, however, together with further objects and advantages thereof, may be best understood by reference to the following description, when taken in conjunction with the accompanying drawings, in which:

Figure 1 is a drawing of the type of high-speed printing apparatus in which the present invention finds utility which is shown to assist in an understanding of the invention;

Figure 2 is a view in perspective of an embodiment of the invention;

Figure 3 is a cross section along the lines 3—3 of Figure 2;

Figure 4 shows a section of a spacer pin;

Figure 5 is a cross section view through a hammer taken along the line 5—5 in Figure 3; and

Figure 6 shows a section of another spacer pin arrangement.

Referring now to Figure 1, there is shown a high-speed printer of the type previously generally described in which the present embodiment of the invention finds use. The high-speed printer comprises a drum 10 having columns of printing type 12 extending axially across the periphery. Identifying marks (not seen) are positioned at one end of the drum for indicating each of the type characters coming into the printing position. These identifying marks are usually detected by a reading head 14. This reading head is coupled to a coincidence device 16 which comprises electronic circuitry for comparing the identification of the character read by the reading head with the identification of a character desired to be printed. A source of printer signals 18 provides these signals. This source may be circuitry to which signals are supplied from a computer memory device. Upon the attainment of coincidence, hammer-control apparatus 20 is actuated to energize solenoids (not shown) which cause a hammer 22 to strike paper 24 which is being slowly passed through between the hammer and the drum. A ribbon 26 supplies the ink for the necessary printing. The ribbon also travels slowly between the paper and the drum. The hammers 22 are usually in a column positioned underneath the lowermost part of the drum and are driven upwards to press the paper against the ribbon and type. Thus, a line of print can be completed before the paper can move to position a fresh area for the next line of print. As may be better seen in Figure 3 each hammer includes a rectangular body section 23 which is inserted between the guide bar assemblies and a tapered head section 25 which does the striking. The head section may include a cap which is a specially heat treated metal to be better able to do the striking.

Referring now to Figure 2, an arrangement for holding and guiding a column of hammers in accordance with an embodiment of the present invention is shown. This consists of two guide bar assemblies 30, 32. These are held in verticle position by spaced mounting blocks 34, 36, only two of which are shown. Spacer blocks 38, 40 space the guide bars the proper distance apart to admit the hammers. The assembly is held in horizontal position by two bolt and nut assemblies 42. As shown in Figure 3, each guide bar assembly includes a guide bar central member 43. Each central member is machined so that the face presented to the hammers has two flat land portions 44, 46, which are at the top and bottom of this face. The guide bar central member itself is made of tool steel

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properly heat treated to provide hardness. After hardening, the land portions are precisely ground and then are hard-chrome plated. The land portions are polished to a high degree. Thus, each hammer is positioned on each side of its rectangular cross section 23 at two places along its length by the lands of the guide bars.

For each guide bar assembly there is also provided two pin-spacer bars 48, 50. Each pin-spacer bar is identically machined flat to fit on either side of the central member. Grooves are machined in each pin spacer bar. A plurality of holes are also drilled at a distance apart so that spacer pins 54, which are inserted in those holes are spaced apart so as to extend between the hammers which are held in a column between the guide bar assemblies. This may be seen in Figure 5. These spacer pins are also extended into the groove in the pin-spacer bar. The pins are hollow and split as shown in Figure 4. A piece of oil-soaked felt 56 is inserted in each of the grooves in the pin-spacer bars. It has been determined that the best action of the printing hammer is obtained when the points of contact in the retaining structure are lightly lubricated. By reason of the pin structure the oil from the wick is brought to the hammer retaining points by capillary action.

Accordingly, each of the hammers are retained and guided on four sides by the land portions on either side of two opposite faces and by four spacer-pins positioned on either side of the other two opposite faces. Thus, a minimum frictional contact area is provided by this invention and further, lubrication is also provided, which further minimizes the effects of friction. The life of the assembly is thus immeasurably extended by the structure provided by this invention. The spacer pins both serve to guide and space the hammers. Suitable running clearances are provided so that each hammer slides freely.

An alternative of spacer pin which may be employed is shown in Figure 6. It comprises a steel core 60 covered by a tubing 62 of a solid material having a low coefficient of friction. With these pins capillary holes are made in the spacer bars to bring oil from the felt wick. The coefficient of friction of Teflon is the lowest of any known solid. Therefore, it may be used advantageously here.

Accordingly, there has been shown and described above an improved hammer-guiding system for high-speed printers. The contact surfaces required have been reduced to a minimum. A means of lubrication has also been provided whereby lengthy and dependable operation of the printing hammers and the guiding assembly is achieved.

I claim:

1. In a high-speed printer of the type wherein there are a plurality of adjacent hammers which are selectively

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impelled and have substantially rectangular body portions, an improved guiding system for said hammers comprising a pair of guide bar members positioned on either side of said hammers each extending at least the length of a column of hammers, each having two narrow land portions spaced on either side of the face of said guide bar members presented to said hammers, a pair of pin spacer bars for each of said guide bar members, said pin-spacer bars being positioned adjacent said member sides which are adjacent to the face presented to said hammers, each pin-spacer bar having a groove extending along its length, a plurality of spacer pins each of which is mounted in one of said pin spacer bars to extend between said hammers, each of which has the end in said pin-spacer bar extending into said pin-spacer bar groove, each of said spacer pins having an opening communicating therethrough from said groove to the portion of the spacer pins extending between said hammers, and lubricating means in said spacer-bar grooves.

2. In a high-speed printer as recited in claim 1 wherein said lubricating means in each said pin-spacer bar groove is a lubricant-soaked wick which contacts the ends of said spacer pins.

3. In a high-speed printer of the type wherein there are a plurality of adjacent hammers which are selectively impelled and which have substantially rectangular body portions, an improved guiding system for said hammers comprising a pair of guide bar members positioned on either side of said hammers each extending at least the length of a column of hammers, each having two narrow spaced flat land portions on the face presented to said hammers, a pair of pin spacer bars placed on either side of said guide bar members, a plurality of spacer pins each of which is mounted in one of said pin spacer bars to extend between said hammers whereby said hammers are guided by said lands and said pins, each of said spacer pins being hollow and split, and means including said pins to apply a lubricant to said hammers, said means to apply a lubricant including means to apply a liquid lubricant to the ends of said pins which extend into said pin spacer bar.

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