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(54) **Impact printer having readily replaceable rotary print member.**

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Courier Press, Leamington Spa, England.

Impact printer having readily replaceable rotary print member

FIELD OF THE INVENTION

The present invention relates to impact printers wherein the print member is moved relative to the printing medium and impact printing is carried out at a plurality of print positions along a lateral line on said printing medium by moving said print member so that a selected type character on said print member coincides with a particular print position and then impacting said character against said print medium through a suitable ink release ribbon or sheet.

BACKGROUND ART

In accordance with the present state of the art, printers which utilize rotating disks with characters arranged on the periphery thereof have been extensively used commercially. These printers generally fall into the daisy wheel class of printers in which print elements having a plurality of type characters respectively are mounted at the ends of a corresponding plurality of spokes or petals extending from a central hub. Patents US—A—4,178,108, 4,189,246, 3,858,509 and 4,044,880 are directed to impact printers using such print wheels.

Most present day impact printer operations require the use of multiple fonts, i.e., multiple print wheels each containing a somewhat different character font. With most print wheel impact printers of the type set forth above, font changing requires some manipulation. Unlike the type-ball impact printers which do not have separate hammer mechanism, in conventional standard print wheel impact printers it has been customary practice to provide some sort of means for getting the hammer assembly out of the way during removal or replacement of the print wheel.

On the other hand, in the above-mentioned type-ball impact printers such as those described in Patents US—A3,703,230, 3,826,345, 3,924,726 and 3,618,735, the type-ball assembly itself serves both the function of character select and the impact hammer function. Because these type-ball impact printers contain no separate hammer assembly, font changing is relatively simple. On the other hand, because the type-balls have a self-contained relatively heavy hammer assembly, they can only operate at relatively low speeds because the high inertia of these relatively heavy balls substantially slows down the impact procedure. Type-ball impact printers generally operate in the order of from 15—30 cps while print wheel impact printers which have a much lower inertia because of the separation of the hammer assembly are capable of operations in the order of 60 cps or greater.

Attention is also directed to Patent US—A—4,037,707 which shows the combination of a cup-shaped print wheel containing a plurality of type characters on fingers and a hammer assembly for driving selected ones of said characters against the printing medium. It should be noted that in this apparatus, the curve of rotation of a selected character through the print position does not extend above the position. Rather, the curve is at a level or plane passing through the print position but not extending above. As the structure of the patent indicates, the hammer assembly extends above the print position. Consequently, the print element cannot be readily removed without manipulating the hammer assembly.

BRIEF DESCRIPTION OF THE PRESENT INVENTION

Accordingly, it is the object of the present invention to provide an impact printer wherein the print wheel is readily removable and replaceable but which still maintains the relatively low inertia and consequently high printing speeds of conventional print wheel impact printers.

This object of the present invention is realized by providing a print wheel impact printer having a separate hammer assembly wherein the print wheel may be removed and replaced without manipulating the hammer assembly.

The present invention involves an improvement to the conventional print wheel impact printer wherein the print member or print wheel is mounted in a position whereat the curve of rotation formed by rotating each selected character through the print position extends above the print position. In this manner, the print element can be conveniently mounted so that it extends above the print hammer assembly since the print hammer assembly is conventionally at or below the print position. Thus, positioned above the print assembly, the print wheel may be readily removed and/or inserted into the printer to change fonts.

BRIEF DESCRIPTION OF THE DRAWINGS

Referring now to the drawings, wherein a preferred embodiment of the invention is illustrated, and wherein like reference numerals are used throughout to designate like parts;

Fig. 1 is a fragmentary generalized view of an impact printer in accordance with the present invention with appropriate sections broken away to illustrate the novel print member assembly structure of the present invention.

Fig. 2 is a diagrammatic side view of the printer apparatus of Fig. 1 with selected portions sectioned in order to illustrate the structure of the present invention. In addition, Fig. 2 shows an additional diagrammatic

standard expedient, i.e., the ribbon.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

In order to illustrate the operating concepts of the preferred embodiment in as simple a form as possible, structures in an impact printer which are standard in the art have been eliminated. First, with reference to Figs. 1 and 2, the print member assembly 10 of the present invention will be illustrated as being mounted on a carrier 11 which is driven by lead screw 12 past a document such as paper 13 mounted on a platen 14. This lead screw carrier drive, details of which have been eliminated, may be any conventional lead screw carrier drive driven by an appropriate stepper motor which is well known in the art.

Step motor 15 is mounted on stanchion 16 of carrier 11 by bracket 17. Step motor 15 drives shaft 18 which in turn drives print member shaft 19 through universal joint 20. Shaft 19 is journaled in shaft bearing housing 21. Spherical print element 22 has a central elastic hub 23 which may be detachably received by a friction fit on stud 24 extending from shaft 19. In order to insure that print element 22 is attached in the correct orientation, central hub 23 has an orientation notch 42 which is aligned with and receives orientation finger 41 of arm 40 which is affixed to shaft 19.

Print element 22 is comprised of a plurality of radial fingers or petals 25 extending from hub 23 to form a composite spherical shape. Type characters 27 are arrayed in a pair of concentric rows along the ends of petals 25.

In order to carry out a printing operation, carrier 11 is moved along the print line past the print positions 26 on said print line. As the carrier 11 is being moved from print position to print position, the next type character 27 to be printed is selected from the peripheral array in the following manner. Let us assume that the character "B" is to be printed at the next print position. The control system for the print wheel which may be any standard print wheel control system, determines the row and petal position of the character "B". As indicated, shaft 19 is tiltable through an angle θ by solenoid 28 which is activated to drive shaft 29 forward against housing tab 30 when print element 22 is being tilted clockwise around universal joint 20 to bring the inner row of type characters into coincidence with the print position 26 as shown in Fig. 2. When a selected character is in the outer peripheral row, then solenoid 28 retracts shaft 29 which releases tab 30. When tab 30 is thus released, shaft 19 and consequently print element 22 mounted thereon are urged counterclockwise by spring means 37 to rotate the print element 22 about universal joint 20 for an angle of θ so that the outer row of type characters is in the print position. While the row of type characters is selected, the print element 22 is rotated to the selected character in that row in the conventional manner.

In addition to carrying print wheel asembly 10, carrier 11 also carries impact hammer assembly 31. The assembly 31 which is shown diagrammatically may be any conventional impact hammer or missile assembly which can be mounted on the carrier 11 so that hammer 32 may be driven against print point 26. In the structure shown, it consists of coil member 33 which is activated through the application of current by conventional means (not shown) during a firing cycle to attract actuator arm 34 and drive hammer 32 against selected character 27 on petal 25 which in turn drives ribbon 35 against paper 13 to imprint the selected character on the paper. At the end of the hammer firing cycle, coil 33 is deactivated permitting actuator arm 34 which is spring loaded to be retracted by spring means 38. With arm 34 retracted, spring arm assembly 39 urges hammer 32 into the initial rest position shown in Fig. 2.

In the preceding description of the present invention, all of the novel aspects of the structure have been described in detail. On the other hand, whatever would be standard to those skilled in the art has only been described in a limited fashion. The state of the art expedient for controlling the escapement, the hammer firing and character selection and for coordinating these two operations have been described in detail in prior art patents for example, Patents US—A—4,178,108 and 4,189,246 assigned to the assignee of the present invention.

It should be noted that with the arrangement shown, as print element 22 is rotated, type character 27 will be rotated in a curve of rotation which extends above print position 26. With this type of a positional arrangement, it may be seen that when it is necessary to change the font, a print element such as print element 22 may be readily removed and/or reinserted on stud 24 without any movement of impact hammer assembly 31.

While the invention has been particularly shown and described with reference to a preferred embodiment it will be understood by those skilled in the art that various other changes in form and detail may be made without departing from the spirit and scope of the invention.

Claims

1. Impact printer having a rotatably mounted print member having an array of type characters arranged around at least a portion of its periphery, and a print hammer operable to impact selected ones of said type characters against a printing medium at a selected print position, characterized in that said print member is rotatably mounted in a position whereat the curve of rotation formed by rotating each selected character through said print position extends above said print position.

2. Printer according to claim 1, characterized in that said print member is circular and said array of characters are arranged in a pair of rows around its periphery.

3. Printer according to claim 2, characterized in that said print member has a curved surface on which said pair of rows of characters are peripherally arranged.

4. Printer according to claim 3, characterized in that said print member is rotatable through the impact path of said print hammer, and further includes means for rotating said print member along either of the axes, the characters in one of said rows being rotatable through said hammer impact path when said print member is being rotated about one of said axes and the characters in the other of said rows being rotatable through said hammer impact path when said print hammer is being rotated about the other of said axes.

5. Printer according to any one of claims 1 to 4, characterized in that it further includes means for detachably mounting said print member whereby said print member may be attached and detached without moving said print hammer.

Revendications

1. Imprimante à impact comportant un élément d'impression monté à rotation, présentant un ensemble de caractères d'impression agencés autour d'au moins une partie de sa périphérie, et un marteau d'impression fonctionnant pour appliquer des caractères selectionnés parmi lesdits caractères d'impression, contre un milieu d'impression à une position d'impression selectionnée, caractérisée en ce que ledit élément d'impression est monté à rotation dans une position où la courbe de rotation formée par la rotation de chaque caractère sélectionné en passant par ladite position d'impression s'étend au dessus de ladite position d'impression.

2. Imprimante selon la revendication 1 caractérisée en ce que ledit élément d'impression est circulaire et en ce que l'ensemble de caractères est agencé en deux rangées à sa périphérie.

3. Imprimante selon la revendication 2, caractérisée en ce que ledit élément d'impression présente une surface incurvée sur la périphérie de laquelle les deux rangées de caractères sont agencées.

4. Imprimante selon la revendication 3 ,caractérisée en ce que ledit élément d'impression est rotatif au travers de la trajectoire d'impact dudit marteau d'impression, et comprend en outre des moyens pour entraîner ledit élément d'impression en rotation sur l'un des axes, les caractères de l'une desdites rangées étant rotatifs au travers de ladite trajectoire d'impact du marteau lorsque ledit élément d'impression est entraîné en rotation autour de l'un desdits axes et les caractères de l'autre rangée étant rotatifs au travers de ladite trajectoire d'impact du marteau lorsque ledit marteau d'impression est entraîné en rotation autour de l'autre axe.

5. Imprimante selon l'une quelconque des revendications 1 à 4, caractérisé en ce qu'elle comprend en outre des moyens permettant le montage amovible dudit élément d'impression, ce qui fait que ledit élément d'impression peut être monté et démonté sans déplacer ledit marteau d'impression.

Patentansprüche

1. Schlagdrucker mit einem drehbar engeordneten Druckglied, das eine Gruppe von auf mindestens einem Teil des Umfangs des Druckelements angebrachten Druckzeichen und einen Druckhammer aufweist, der betätigt werden kann, um ausgewählte Druckzeichen aus der Druckzeichen-Gruppe auf dem Drucktraeger an ausgewählte Druckpositionen aufzuschlagen, dadurch gekennzeichnet, dass das Druckglied in einer Lage drehbar angeordnet ist, worin die der Drehung jedes ausgewählten Druckzeichens quer die Druckposition entsprechende Krümmung über diese Druckposition sich erstreckt.

2. Drucker nach Anspruch 1, dadurch gekennzeichnet, dass das Druckglied kreisförmig ist, und die Druckzeichen-Gruppe aus einem Paar von auf dem Druckgliedsumfang angebrachten Reihen besteht.

3. Drucker nach Anspruch 2, dadurch gekennzeichnet, dass das Druckglied eine gekrümmte Fläche aufweist, auf deren Umfang das Paar von Reihen angebracht ist.

4. Drucker nach Anspruch 3, dadurch gekennzeichnet, dass das Druckglied drehbar quer die Arbeitsbahn des Druckhammers durchlaufen kann, und ausserdem Antriebsmittel aufweist, die das Druckglied um eine seiner Achsen drehen lässen, wobei die in einer der Reihen beinhaltenen Druckzeichen quer die Arbeitsbahn des Druckhammers drehbar durchlaufen können, wenn das Druckglied um eine seiner Achsen dreht, und die in der anderen Reihe beinhaltenen Druckzeichen quer die Arbeitsbahn des Druckhammers durchlaufen können, wenn das Druckglied um seine andere Achse dreht.

5. Drucker nach einem der Ansprüche 1 bis 4, dadurch gekennzeichnet, dass er ausserdem Mittel, um das Druckglied lösbar anzuordnen, aufweist, wodurch Ankupplung oder Entkupplung des Druckgliedes ohne Entfernen des Druckhammers erfolgen kann.

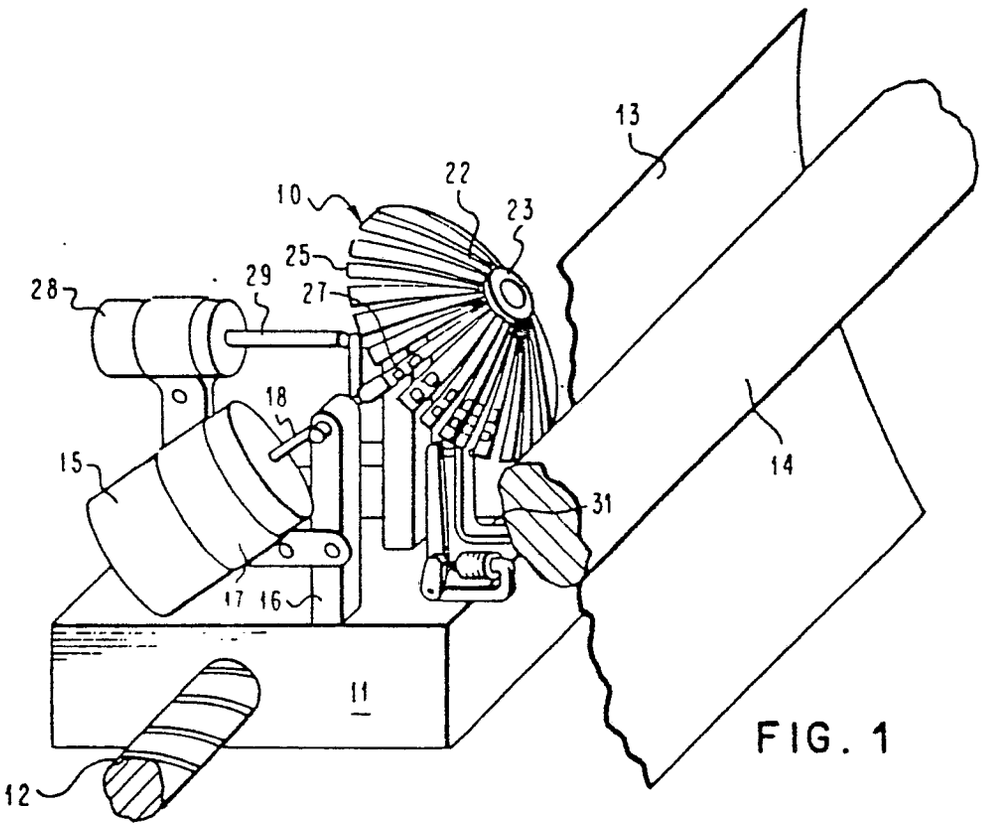

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FIG. 1

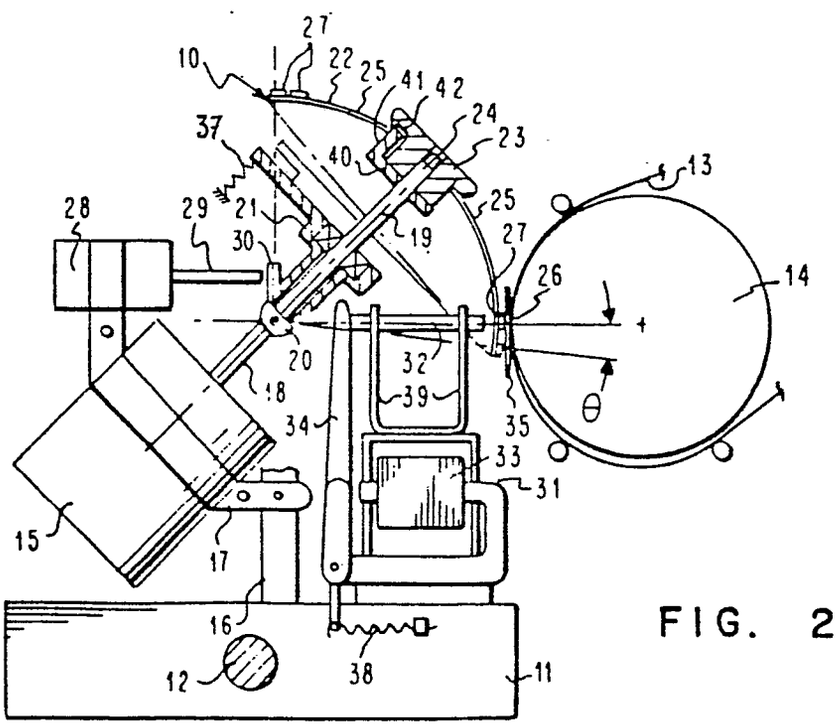

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FIG. 2