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## (54) Printing method and apparatus.

(57) The front side of a printing medium is brought into surface contact with a transparent platen extending across the medium from side to side. The printing medium is of such type that enables characters printed on the reverse side thereof to be read from the front side thereof. Disposed on the reverse side of the printing medium is a printing block which travels parallel to the transparent platen for printing reversed characters on the reverse side of the printing medium at a position corresponding to the platen. Characters printed in reverse form on the reverse side of the printing medium appear in correct, readible form on the front side thereof and are visible through the transparent platen the instant they are printed.

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# TITLE OF THE INVENTION

# PRINTING METHOD AND APPARATUS

## BACKGROUND OF THE INVENTION

This invention relates to a printing method and apparatus wherein characters can be read at the instant they are printed on printing medium.

The recent growth of the electronic computer industry has been accompanied by the development of a wide variety of printers. In all of these printers, however, the location on the printing medium where characters are printed is obstructed from view by the printing element such as a printing block as the characters are printed. The characters therefore cannot be read until the printing medium is advanced by one or two lines. Accordingly, in situations where it is necessary to take some action based upon the printed results, such action is delayed by one or two lines, namely by the amount of time needed for the printed line to come into view. Though a printer may be arranged so as to permit one to peer into the printing block in order to read the characters while they are being printed, such an arrangement places a restriction upon the installation location and space.

## SUMMARY OF THE INVENTION

Accordingly, an object of the present invention is to provide a printing method and a printing apparatus for practicing the method, wherein printed information can be read with ease at the same time that the

information is printed on a printing medium.

According to the present invention, the foregoing object is attained by providing a printing method which includes steps of contacting the front side of a printing medium with a transparent platen, which printing medium is of a type that enables characters printed on its reverse side to be read from its front side, and printing reversed characters on the reverse side of the printing medium by a printing block at a position corresponding to the transparent platen. To practice the method of the invention, there is provided a printing apparatus comprising a feed mechanism for intermittently feeding the printing medium of the above-described type, a take-up mechanism for taking up the printing medium fed by the feed mechanism, a printing block disposed on the reverse side of the printing medium for printing a line of reversed characters across the reverse side thereof, and a transparent platen disposed on the front side of the printing medium and in surface contact therewith at a position corresponding to the line of characters printed on the reverse side of the printing medium by the printing block.

Other features and advantages of the present invention will be apparent from the following description taken in conjunction with the accompanying drawing.

## BRIEF DESCRIPTION OF THE DRAWING

The sole Figure is a perspective view of a

printing apparatus embodying the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference to the Figure, a preferred embodiment of a printing apparatus according to the present invention includes a feed mechanism 1 for feeding a printing paper 2, a take-up mechanism 3 for taking up the printing paper, a transparent platen 4, and a printing block 5 accommodating a printing element.

The printing paper 2, having a row of equidistantly spaced feed holes 21 along both side edges thereof, has its front side brought into surface contact with the reverse side of the platen 4 between the feed mechanism 1 and take-up mechanism 3, the platen 4 serving to hold the paper in a tensioned state.. These mechanisms may be of a type known in the art. By way of example, in the illustrated embodiment the feed mechanism 1 comprises a roller 11 rotated by a driving motor (not shown), a shaft 12 on which the roller 11 is mounted, and a number of paper feed pins 13 provided on the roller 11 and arranged to mate with the feed holes 11 formed in the printing paper 2 for advancing the paper intermittently when the roller 11 is rotated in the feed direction. The take-up mechanism 3 comprises a roller 31 rotated by a driving motor (not shown), a shaft 32 on which the roller 31 is mounted, and a number of paper feed pins 33 provided on the roller 31 and arranged to mate with the feed holes 21 formed in the printing paper 2 for pulling the paper in the

direction of feed when the roller 31 is so rotated.

Though the kind of printing paper 2 used is decided by the construction and mode of operation of the printing block 5, the printing paper employed in the apparatus of the present invention may be any that permits characters, which are printed thereon from the reverse side, to be read from the front side thereof. In systems where characters printed on the reverse side of the paper by means such as an ink ribbon or ink jet do not appear on the front of the paper, the printing medium employed in a semi-transparent paper which will allow the characters to be read from the front side. In a configuration which relies upon the application of pressure or heat for printing, the printing medium is a pressure sensitive recording paper or thermosensitive paper, respectively, the front surface whereof changes color in a pattern corresponding to the character printed on the reverse side.

As described above, the platen 4 is transparent and tensions the printing paper 2 the front surface of which is brought into contact with the reverse side of the platen. In addition to tensioning the printing paper, the platen 4 permits information, printed on the reverse side of the printing paper 2, to be read from the front side thereof. To this end, the platen 4 consists of a transparent material such as glass or transparent plastic. The platen 4 may comprise a plate-shaped member having a flat or curved cross

section, or may be provided with a lens-shaped configuration for the purpose of magnifying the printed information appearing on the printing paper. Though there is no particular restriction upon the shape of the platen 4, the reverse side thereof, namely the side that comes into surface contact with the front side of the printing paper 2, is preferably of a substantially flat shape so as not to impair the printing of characters on the printing paper contacting the platen.

A pair of rails 51 are disposed at the back of the printing paper 2 so as to lie parallel to the platen 4. The printing block 5 is adapted to travel along the rails 51 while printing characters on the portion of the printing paper 2 interposed between the printing block and the platen 4. As mentioned earlier, the printing block 5 may employ any of the known printing processes, such as those which rely upon an ink ribbon, ink jet, applied pressure and applied heat, the particular arrangement being selected depending upon the kind of printing paper 2 used. Since characters printed on the reverse side of the paper 2 are to be read from the front side thereof, the printing block 5 has a printing element designed to print characters which would appear reversed if viewed from the reverse side of the paper, but which appear in normal fashion on the front side of the paper.

In the operation of the invention, the printing block 5 is driven along the rails 51 parallel to the

platen 4 on its reverse side to print a line of characters on the reverse side of the printing paper 2 at the portion thereof interposed between the printing block and the platen when the paper is at rest. The characters appear in readible form on the front side of the paper and can be seen through the transparent platen 4.

Since the printing block 5 and associated equipment are located on the reverse side of the printing paper, ones field of view is completely unobstructed so that the line of printed information can be read from any angle at the same time that the characters are printed. Accordingly, one need not wait for the printer to begin a new line before the line just printed can be read by being advanced into view through feeding of the printing paper. This enables one to make some necessary response to the printed information immediately since the information is capable of being read as soon as it is printed. In addition, the fact that the information is readible over a wide range of viewing angles enables the printer to be installed at a greater variety of locations so that greater use can be made of available space.

As many apparently widely different embodiments of the present invention can be made without departing from the spirit and scope thereof, it is to be understood that the invention is not limited to the specific embodiments thereof except as defined in the appended claims.

WHAT WE CLAIM IS:

1. A printing method comprising the steps of:

bringing the front side of a printing medium into surface contact with a transparent platen, said printing medium enabling characters printed on the reverse side thereof to be read from the front side thereof, and

printing reversed characters on the reverse side of said printing medium by a printing block at a position corresponding to the transparent platen.

2. A printing apparatus comprising:

feed means for intermittently feeding a printing medium which enables characters printed on the reverse side thereof to be read from the front side thereof;

take-up means for taking up the printing medium fed by said feed means;

a printing block disposed on the reverse side of the printing medium for printing a line of reversed characters across the reverse side of the printing medium when the printing medium is at rest; and

a transparent platen disposed on the front side of the printing medium and in surface contact therewith at a position corresponding to the line of characters printed on the reverse side of the printing medium by said printing block.

3. The printing apparatus according to claim 2, wherein said transparent platen has a plate-like configuration.

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FIG. 1.