The use of an optical wedge for directing the beams of a photocomposing machine from one font to another by moving the wedge and masking means to limit the optical field.
MULTIFONT PHOTOCOMPOSING MECHANISM

DESCRIPTION

The present invention is directed to a photocomposing machine. In such machines, light is directed from a light source through a character in a font of characters and onto a reflecting surface for redirection to a photosensitive sheet of material.

In some such machines, the font carrier is a strip of transparent material with more than a single font on it. Heretofore, the change in the use of one font or another has involved movement of the font or the lens system. In some machines, complicated masking means and movement of the light generating means has been necessary when it is desired to change from one font to another. This is especially complicated if it is desired to use more than a single font in the composition of a particular piece — such as the use of italics.

In addition, when alternating from one font to another, the field of vision of the beam may encompass more than a single character as, for example, when one goes from a larger type font to a smaller type font. Heretofore, complicated masking devices were associated with the font and this again necessitated complicated control systems.

The present invention overcomes these difficulties and has for one of its objects an improved photocomposing machine which can easily change the direction of the beam.

Another object of the present invention is the provision of an improved photocomposing machine which has an optical mechanism for redirecting the path of the light beam from one font to another.

Another object of the present invention is the provision of an improved photocomposing machine for moving a redirecting surface to redirect the light beam from one path to another.

Another object of the present invention is an improved photocomposing machine whereby masking means are mounted in the path of the light beam to change the optical field.

Another object of the invention will be obvious upon an understanding of the illustrative embodiment about to be described or will be indicated in the appended claims, and various advantages not referred to herein will occur to one skilled in the art upon employment of the invention in practice.

A preferred embodiment of the invention has been chosen for purposes of illustration and description and is shown in the accompanying drawings, forming a part of the specification, wherein:

FIG. 1 is a diagrammatic view of the present invention;
FIG. 2 is a diagrammatic view of a font carrier strip to be used with the present invention;
FIG. 3 is a top elevational view of the mechanism of the present invention;
FIG. 4 is a front elevational view thereof;
FIG. 5 is a side elevational view thereof;
FIG. 6 is a detailed view showing the position of the optical wedge for directing the beam in one direction against one font; and
FIG. 7 is a detailed view of the optical wedge showing it in position to direct the beam in another direction against another font.

The photocopy machine in which the present invention is particularly adapted to be used is described and shown in U.S. Patent application Ser. No. 825,692 filed May 19, 1969 and schematically shown in FIG. 1.

A source of light 1 is powered by a power supply 2 to create an intense, short burst of light 17 at a wave length most suited for the light-sensitive material or film 16 being used. The source of light 1 may be any high intensity coherent light source which gives a monochromatic beam, such as a laser or a neon flash tube. Of course, other light sources may also be used, if desired.

The light beam 17 may pass through a modulator (not shown) and continues to a character font drum assembly 4. The font drum assembly 4 which is continuously rotated by motor 19. The drum assembly 4 comprises drum 4c, having a film strip 4b consisting of a plurality of fonts of transparent characters 4e and 4d. When the light beam 17 is generated, as explained in greater detail hereinafter, it is directed to a reflecting mechanism 25, which, in the drawings, is shown as being a penta reflector. It is then redirected through a selected character in the font strip 4b and the image 2b of that character is directed to a lens system 8.

The lens system 8 will direct the character image 2b to a reflecting surface 9, which is shown in the application as a mirror, for reflecting the character image 2b onto the photo-sensitive film 16 as at 26. The mirror 9 is moved by a motor 10 so that the image 17b of the character projected by the mirror 9 will be directed to a different part of the photo-sensitive film 16 to form the line 26. In other words, as each character image 17b is flashed onto the sheet 16, the mirror 9 is adjusted to sweep an arc across the face of photo-sensitive material 16 so that a line of characters 6 is impressed thereon.

The mirror 9 is moved in angular increments so that the line 6 will be justified. The distance between the mirror 9 and the paper film 16 is so great that the distortion of the image projected on the paper is minimal, if at all.

At the end of a line 26 the film 16 is moved upwardly so that another line can be printed. The film then passes through a developer mechanism 23 and is then cut by cutting mechanism 24 into strips for future use and assembly.

Above the bank of characters 4d and 4e on the rotating drum film strip 4b, there is provided a plurality of counting gate openings 18. One gate opening 18 is mounted in line with characters 4d and 4e. The drum 4c is provided with a light source 27 adapted to project light through each gate opening 18 as the gate opening 18 passes thereby. The light is directed onto a control photo diode 5. When the photo diode 5 is activated a pulse is generated which is fed into a counter mechanism 6. The output of this counter 6 is fed to a gate 7 (which is connected to the light power supply 2) and represents one of the conditions of the gate 7.

A tape reader 12 is adapted to sense code combinations on a tape (not shown) and transfer them to an electronic computer (not shown) which has predetermined character and line data therein and which has stored therein a particular number count to each character. The count is transferred to the gate mechanism 7 and when the count of a particular character is
reached by the counter 6 it coincides with the count from the computer to satisfy conditions of gate 7. Upon coincidence, a pulse is sent to the light powered supply 2 and to the character width and spacing electronics (not shown). However, the signal to the power supply 2 is inhibited. After a time interval, e.g., 2 microseconds, the mirror 9 is moved a predetermined angle directly proportional to the width and spacing of the particular character to be reproduced. As soon as the mirror is in position, the inhibit is slowed and the light power supply 2 is activated to flash the light source 1.

It is sometimes desirable to utilize the two fonts 4d and 4e on the single strip 4b and to alternate between them. The direction of the beam 17 must then be changed in order to cause it to pass through either of the two fonts 4d and 4e. In the present invention, this has been accomplished by using a refracting optical wedge 30 which directs the beam through either font 4e or font 4d by changing the refracting angle thereof.

In the drawing, the wedge 30 is shown as having a pair of wedge-shaped circular optical lenses 31 and 32 each of which has its outer face 33 and 34, respectively, normal to the path of the light beam 17 and their inner faces 35 contacting each other and at an angle to the path of the light 17. The angle of the inner face 35 is predetermined depending upon how much the beam 17 is to be directed as it passes through wedge 30.

In practice, the effective angle of the direct face 31 of the wedge 30 is changed by rotating the wedge 30. Hence, when the optical wedge 30 is in one position, as shown in FIG. 6, the beam 17 will enter normal thereto and be directed in one predetermined path 17a. By rotating the wedge 30 by an angle, for example, 180°, the wedge 30 will be reversed so that the angle of the inner face 35 is reversed and the beam 19 is now directed in direction 17b in a path which diverges from the path 17a.

Hence, the beam 17 may be directed along path 17a to pass through a character in font 4d or may be directed along path 17b to pass through a character in font 4e by rotating the wedge 30. Although two fonts 4d and 4e have been shown in the drawings, it will be understood that a plurality of fonts may be used and that by rotating the wedge 30 in a plurality of different angles it is possible to direct the beam against any single one of a plurality of fonts.

It will also be understood that any redirecting mechanism such as a reflecting surface, may be used in place of the wedge 30, without departing from the spirit of the present invention.

The wedge is mounted on a frame member 60 which is attached to the superstructure of the machine having an upstanding arm 61 and a base member 62. The wedge holder 50 has a stop 54 against which the lenses are to be mounted and a tubular removable inner sleeve 55 adapted to permit the lens to be replaced or adjusted, if necessary. The shutter openings 41 in the shutters 42 are controlled by a shutter assembly mechanism 44 which is adapted to be moved inwardly and outwardly as the case may be.

As was indicated, the font 4d may be smaller than the font 4e so that the field of vision of the beam 17a which is directed through font 4d may now encompass more than a single character. Masking means in the form of shutter member 40 with opening 41 therein is adapted to be inserted in the path of the beam 17a or b to reduce the optical field to a single character so that the beam can now make the image of a single character in font 4d.

The mechanism for the wedge and shutters described above is shown in detail in FIGS. 3 to 7 and comprises the wedge 30 being mounted within a rotatable sleeve 50 controlled by a control motor 51 through gear member 52. When one font is to be viewed, the motor 51 will be activated so that the gear mechanism 52 rotates the entire lens holder 50 on bearings 53. This rotation is in one direction or the other, as the case may be.

The shutter mechanism 40 is controlled by solenoids 43 which are adapted to advance the shutter 42 or withdraw the shutters 42 depending upon which letters of the smaller font 4d are to be used.

It will thus be seen that the present invention provides an improved photocomposing machine which can easily change the direction of the beam which has an optical mechanism for redirecting the path of the light beam from one font to another and which has masking means mounted in the path of the light beam to change the optical field.

As many and varied modifications of the subject matter of this invention will become apparent to those skilled in the art from the detailed description given hereinabove, it will be understood that the present invention is limited only as provided in the claims appended hereto.

Having thus described our invention, we claim:

1. A photocomposing machine comprising means for generating a beam of light, a font assembly having a pair of fonts, optical beam diverting means interposed between said generating means and said font assembly for shifting the beam along a plurality of directions, reflector means interposed between said beam diverting means and said font to direct said light beam through one of said fonts in said font assembly.

2. A photocomposing machine as claimed in claim 1, wherein said reflection means comprise means for bending the beam.

3. A photocomposing machine as claimed in claim 2 wherein said reflection means comprise optical redirecting means.

4. A photocomposing machine as claimed in claim 3, wherein said reflection means comprise an optical redirecting surface.

5. A photocomposing machine as claimed in claim 4, wherein said optical redirecting surface is movable to present a different angle to the beam.

6. A photocomposing machine as claimed in 5, wherein said surface is a rotatably mounted angled surface.

7. A photocomposing machine as claimed in claim 6, wherein said beam is an optical wedge assembly.

8. A photocomposing machine as claimed in claim 7, wherein said optical wedge assembly is adapted to be rotated.

9. A photocomposing machine as claimed in claim 8, wherein said optical wedge assembly is adapted to be rotated.

10. A photocomposing machine as claimed in claim 9, wherein said wedges' angled surfaces are in complementary relationship to each other.

11. A photocomposing machine as claimed in claim 10, wherein the angled surfaces are in contact with each other.
12. A photocomposing machine as claimed in claim 11, wherein motor means are provided to cause the wedge to be rotated.

13. A photocomposing machine as claimed in claim 1, wherein masking means are mounted for movement into the path of the beam to alter the field of the beam.

14. A photocomposing machine as claimed in claim 13, wherein said masking means has an opening therein and is movable in front of said beam.

15. A photocomposing machine as claimed in claim 14, wherein a pair of masking means are provided.

16. A photocomposing machine as claimed in claim 15, wherein solenoid means are provided to control the movement of said masking means.

17. A photocomposing machine as claimed in claim 11, wherein said wedges are mounted within a tube assembly.

18. A wedge assembly as claimed in claim 17, wherein said tube assembly has a sleeve mounted therewithin to permit the wedges to be removed.

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