

[54] **PHOTOGRAPHIC COMPOSITION SYSTEM**

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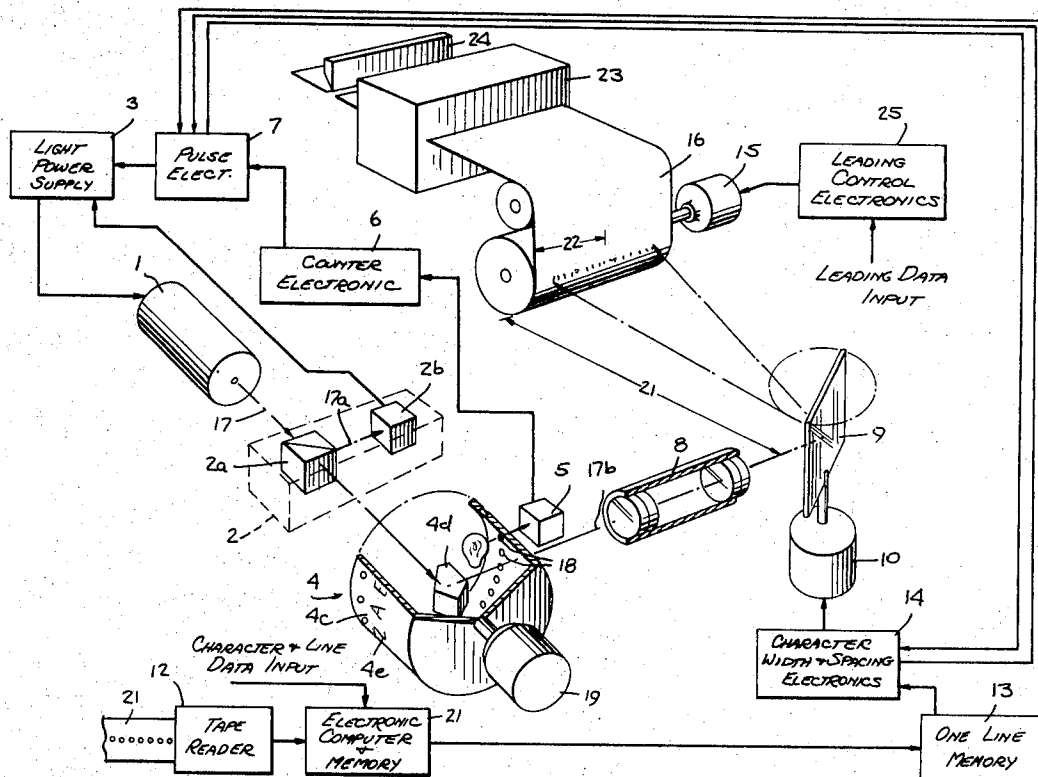
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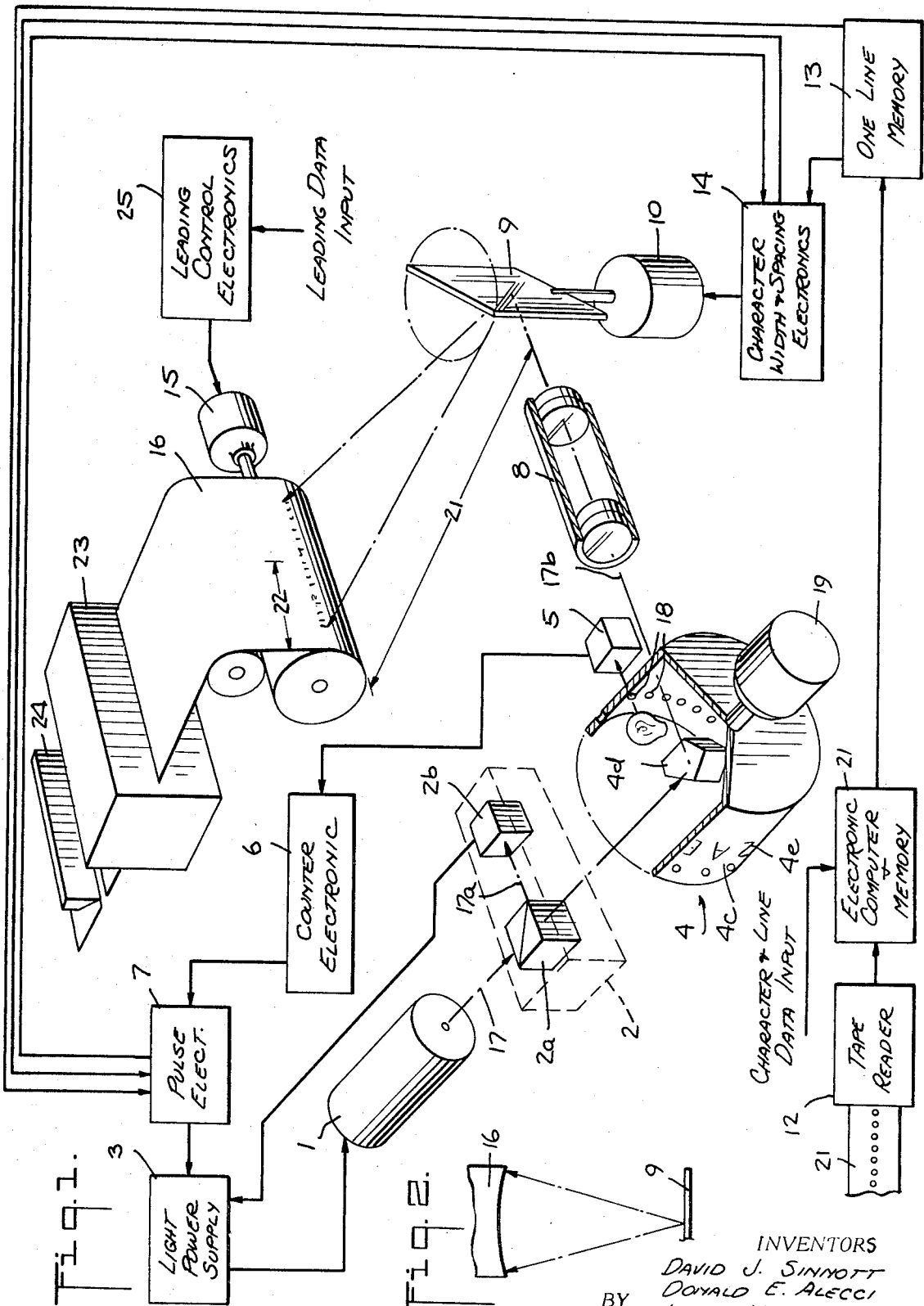
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[57] **ABSTRACT**

A photographic composition system having a pulsed light source that projects a beam of light through a font of characters to produce an image which is cast by a rotating reflector onto a sheet of film. The controls for activating the rotating mirror are connected to a memory system which receives data input and justifies each line of type that is to be printed.

19 Claims, 2 Drawing Figures





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PHOTOGRAPHIC COMPOSITION SYSTEM

DESCRIPTION

This invention relates to typesetting and composition of printed matter and in particular to an improved phototype composition and type preparation system and mechanism for the preparation of proof copy and printing plates for offset, letter and lithographic presses. Such equipment operates by taking a punched tape input, which may be prepared on any tape perforator now commonly used, and converting the data into a photocomposition which is fully justified.

Photocomposing machines are well known in the art. In some machines, cut stencils were interposed between a light source and light sensitive paper for film, and the paper or film was progressively moved for proper alignment and spacing of the characters. The production rate of these machines was necessarily low and required a high degree of skill from the operator. In other machines the stencils were placed on rotary plates, strips, or drums to form a character created by a light source. These characters were progressively placed on film or paper by a translating prism-mirror optical system to create a line of type. Obviously, the speed of such machines was limited by the light source and the translating means of placement of each character on the film or paper.

The principal object of this invention is an improved photocomposition machine that will prepare a more rapid typesetting copy and film for preparation of printing plates or finished printed material at speeds compatible both with the present requirements of the graphic arts and the skills now available in any newspaper, book publisher or print shop.

A pulsed light beam is projected through a revolving drum containing character masks and the character image is reflected by a rotating mirror onto a sensitive sheet to produce characters that are fully justified and leaded.

Another object of the present invention is to provide an improved composing mechanism which does not step the rotating font in selecting the character to be projected.

Other and further objects 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 schematic illustration of the laser composition mechanism; and

FIG. 2 is a view showing another embodiment of the invention wherein the film is curved and is placed closer to the rotating mirror.

As seen in FIG. 1, a source of light 1 is powered by a power supply 3 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 zeon flash tube. Of course, other light sources may also be used if desired.

The light beam 17 passes through a modulator 2 which controls and monitors the light intensity. The modulator 2 comprises a beam splitter 2a which splits the beam 17. A portion of the light 17a is deflected to a photo diode and amplifier light intensity assembly 2b and the remainder of the light beam 17 continues through the beam splitter 2a to a character font assembly 4.

The photo diode assembly 2b samples the light intensity of the beam 17a and compares the actual intensity with a desired predetermined value thereof to thereby control the light power supply 3. If the intensity is greater or less than the desired amount, the diode intensity control assembly 12b directs the power supply 3 to adjust the intensity to acceptable levels.

The portion of light beam 17 which passes through splitter 2a is directed to a continuously rotating font drum assembly 4 which is driven by motor 19. The drum assembly 4 comprises a mask 4c, consisting of a plurality of transparent characters 4e. When the light beam 17 is generated, as explained in greater detail hereinafter, it is directed to a reflecting mechanism 4d, which in the drawings is shown as being a penta reflector. It is then reflected and directed through a selected character 4e to direct the image 17b of that character to a lens system 8.

The lens system 8 will direct the character image 17b to a reflecting surface 9, which is shown as a mirror for reflecting the character image 17b onto the photo-sensitive film 16. 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. 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 photosensitive material 16 so that a line of characters is impressed thereon. The mirror 9 is turned predetermined increments so that the line 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. If desired, the film can be curved as shown in FIG. 2 so that the projected image strikes normal to the paper. In this event, the mirror 9 can be located closer to the film sheet 16.

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

The mechanism for generating the light means will now be described.

Above the bank of characters 4e on the rotating drum 4c, there is provided a plurality of counting gate openings 18. One gate opening 18 is mounted above each character 4e. The drum 4c is provided with a light source 4a adapted to project light through each gate 18 as the gate 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 3) and represents one of the conditions of the gate 7.

A tape reader 12 is adapted to sense code combinations on a tape 22 and transfer them to an electronic computer and memory 21 which has predetermined character and line data therein. The output of the

memory 21 is fed to a one line memory 13 which applies a particular number count to each character. The count is transferred to the pulse mechanism 7 and when the count of a particular character is reached by the counter 6 it coincides with the count from the memory 13 to satisfy conditions of gate 7.

A pulse is sent to the light powered supply 6 and to the character width and spacing electronics 14. However, the signal to the power supply 3 is inhibited. After a time interval, e.g., 2 microseconds, the electronics 14 moves mirror 9 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 spacing unit 14 sends a signal to the pulse unit 7 removing the inhibit and thereby pulsing the light power supply to flash the light source 1.

The light which is generated is directed onto the photo-sensitive film 16 through modulator, font and mirror as discussed above.

It will thus be seen that the present invention provides an improved photocomposing machine which will prepare a more rapid typesetting copy and film for preparation of printing plates at speeds which are compatible with present day requirements. The system provides a completely justified line of film rapidly and accurately.

As various changes may be made in the form, construction and arrangement of the parts herein without departing from the spirit and scope of the invention and without sacrificing any of its advantages, it is to be understood that all matter herein is to be interpreted as illustrative and not in a limiting sense.

We claim:

1. A photo composing mechanism comprising means for reading impulses from a character data carrier, count storage means independent of said character data carrier having information representing each character by a predetermined count, a light source, a drum having a font of transparent characters on its periphery, means for continuously rotating said drum, a beam diverter mounted within said drum, means for counting the number of characters on said drum passing a predetermined point, means for detecting coincidence between the number of characters passing said point and the predetermined count of the character read by the reading means, means operable by said coincidence to activate said light source to generate a light beam, said light beam being projected within said drum and against said diverter to redirect it and cause it to pass through the selected character in the font to form an image of the character, means for directing the image of each character onto a photo-sensitive sheet, width storage means independent of said character data carrier and independent of said font having the width characteristics of each character, a movable reflector outside of said drum in the path of said image, said movable reflector being adapted to direct the image against the photo-sensitive sheet, said photo-sensitive sheet being movable in a path perpendicular of the path of the movable reflector, means for maintaining said photo-sensitive sheet stationary until a line of characters has been impressed on said sheet, means for moving the photo-sensitive sheet in said perpendicular direction when a line has been completed, means responsive to width characteristics in said width

storage means for moving the movable reflector a predetermined distance whereby the movable reflector will direct the image of the characters in a single line on said photo-sensitive sheet in accurately spaced relationship to each other, inhibit means to inhibit the pulsing of the light beam until the reflector is in proper position, means for removing the inhibit when the reflector mechanism is in position, said counting means comprising an opening adjacent each transparent character, a light source within the drum and directing a light ray through said opening and a light-sensitive count sensor adapted to receive said light ray, and a lens system between the reflector mechanism and said drum.

2. A mechanism as claimed in claim 1 wherein pulsing of the light power supply is inhibited until the reflecting mechanism is in proper position.

3. A mechanism as claimed in claim 2 wherein means are provided to remove the inhibit when the reflecting mechanism is in position.

4. A mechanism as claimed in claim 3 wherein said font has a plurality of transparent characters.

5. A mechanism as claimed in claim 4 wherein said sensing means comprises a gate adjacent each character.

6. A mechanism as claimed in claim 5 wherein a light sensitive mechanism is provided for sensing said gates and is connected to said counting means.

7. A mechanism as claimed in claim 6 wherein a light source is mounted on one side of said font and said sensing means are mounted on the opposite side thereof.

8. A mechanism as claimed in claim 7 wherein said gate is an opening adjacent said characters.

9. A mechanism as claimed in claim 7 wherein a lens system is mounted between the said reflecting mechanism and said drum.

10. A photo composing mechanism comprising means for reading impulses from a character data carrier, means for representing each character read by a count, a light source, a font of characters, means for continuously moving said font of characters, means for counting the number of characters on said font passing a predetermined point, means for detecting coincidence between the number of characters passing said point and the count represented by the character reading means, means operable by said coincidence to activate said light source to generate a light beam, means for passing the light beam through the selected character in the font to form an image of the character and means for directing said image onto a photo-sensitive sheet, means for directing said image to a movable reflecting mechanism, said reflecting mechanism being moved a predetermined amount in order to direct adjoining character images onto said photo-sensitive sheet spaced in accordance with predetermined width characteristic, movement of said reflecting mechanism being controlled by a memory mechanism operatively connected to the reading means and by the coincidence detecting means, means for inhibiting the pulsing of the light power supply until the reflecting mechanism is in proper position, means to remove the inhibit when the reflecting mechanism is in position, said counting means comprising means for sensing the position of each character as it passes said predetermined point,

said font having a plurality of transparent characters, said sensing means comprising a gate adjacent each character, a light sensitive mechanism being provided for sensing said gates and connected to said counting means, a light source being mounted on one side of said font and said sensing means mounted on the opposite side thereof, said gate being an opening adjacent said characters, said font being a continuously rotating drum, the generated light beam being directed by a reflector in said drum, the generated light beam passing through the transparent characters in the drum to direct the image thereof to the reflecting mechanism, a lens system being mounted between the said reflecting mechanism and said drum, means being provided for adjusting the intensity of said light, said adjusting means comprises a beam splitter which directs a portion of said generated beam to an intensity measuring device for controlling the intensity of the light source.

11. A mechanism as claimed in claim 10 wherein the reflector in the drum is a penta reflector.

12. A mechanism as claimed in claim 11 wherein the distance between the mirror and the photo-sensitive

sheet is long so that there is no distortion.

13. A mechanism as claimed in claim 11 wherein the photo-sensitive sheet is curved.

14. A mechanism as claimed in claim 11 wherein the photo-sensitive sheet is moved up after a line is completed.

15. A mechanism as claimed in claim 1 wherein a beam splitter is provided which directs a portion of said generated beam to an intensity measuring device for controlling the intensity of the light source.

16. A mechanism as claimed in claim 15 wherein the reflector in the drum is a penta reflector.

17. A mechanism as claimed in claim 16 wherein the distance between the reflector and the photo-sensitive sheet is long so that there is no distortion.

18. A mechanism as claimed in claim 16 wherein the photo-sensitive sheet is curved.

19. A mechanism as claimed in claim 16 wherein the photo-sensitive sheet is moved up after a line is completed.

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