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Booth

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[54] **OPTICAL DEVICE FOR CONVERTING A PHOTOTYPESETTER INTO HEADLINER OPERATION**

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[52] **U.S. Cl.** **354/5**

[51] **Int. Cl.**[2] **B41B 13/00**

[58] **Field of Search** 354/5, 12–18; 353/49, 82

[56] **References Cited**

UNITED STATES PATENTS

2,670,665	3/1954	Caldwell	354/13
3,687,025	8/1972	Rosin	354/5

FOREIGN PATENTS OR APPLICATIONS

679,930	9/1952	United Kingdom	354/5

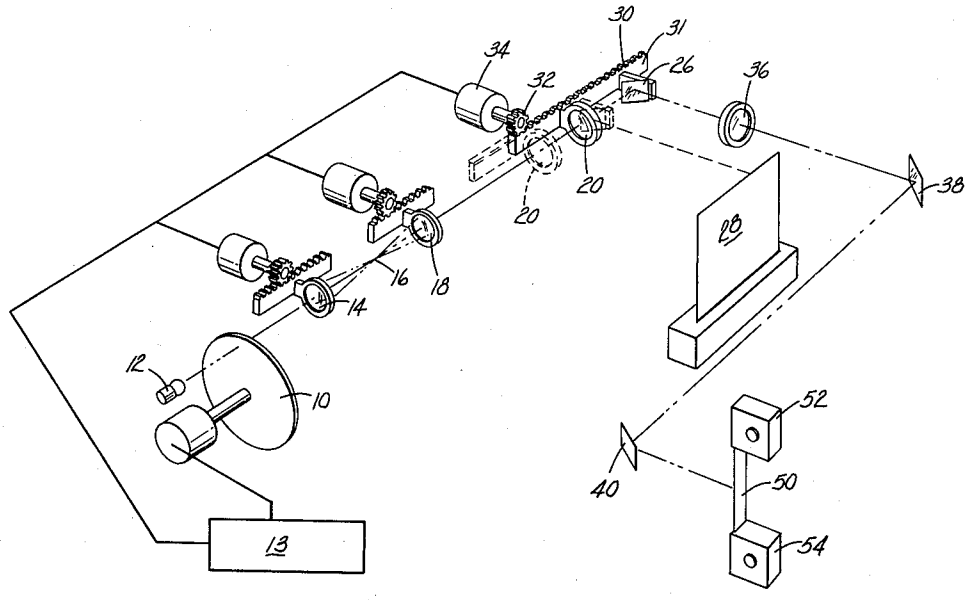
Primary Examiner—John M. Horan

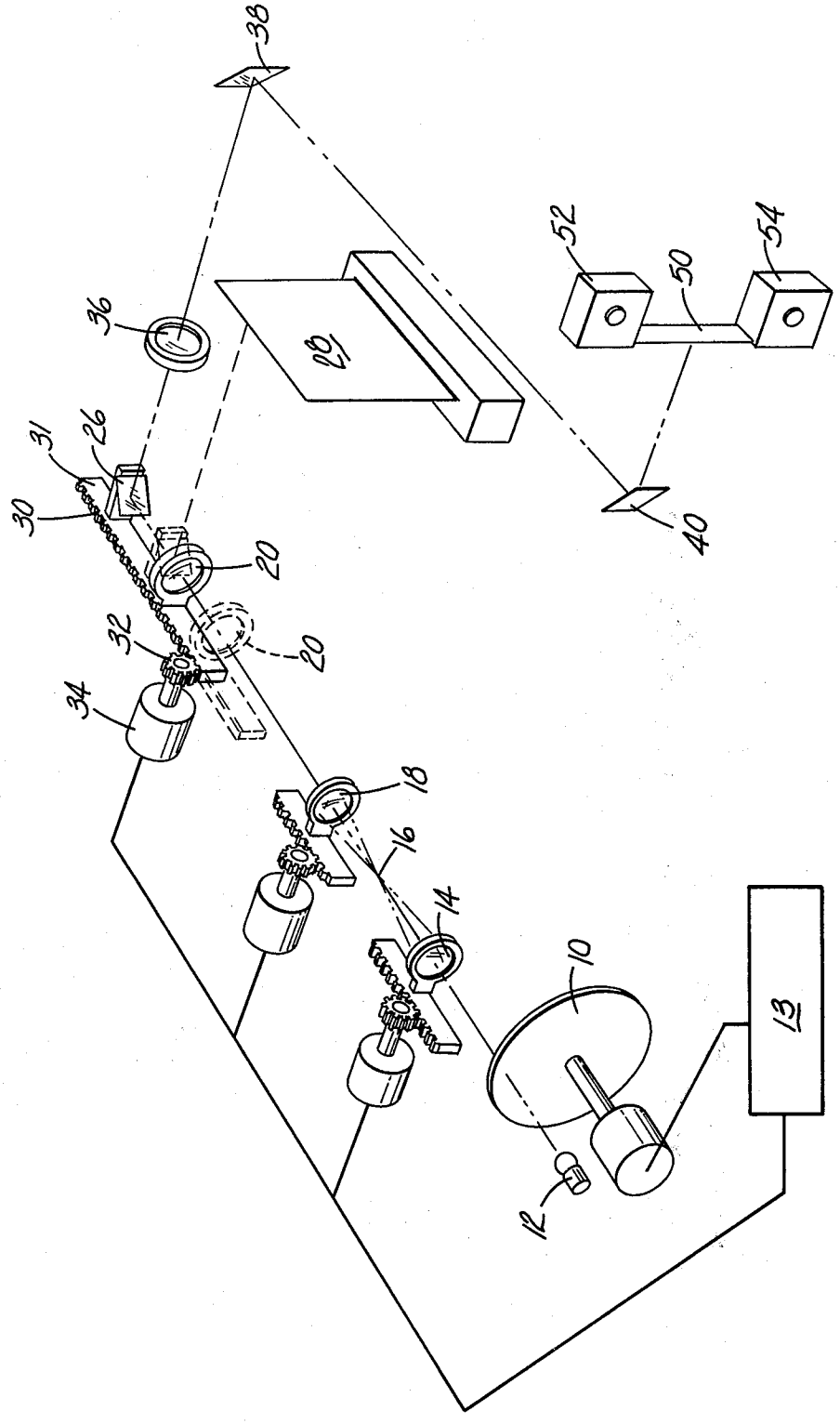
Attorney, Agent, or Firm—Ray S. Pyle

[57] **ABSTRACT**

A dual function photocomposing machine for composition of both text and display size type in one machine from one font matrix. The composition of one form may follow the other, or if desired, it is feasible to intermix the text and display size type composition by switching from one to the other.

3 Claims, 1 Drawing Figure




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OPTICAL DEVICE FOR CONVERTING A PHOTOTYPESETTER INTO HEADLINER OPERATION

BACKGROUND OF THE INVENTION

Printing has evolved through many stages from the early hand-set type pieces until present technology has made available the rapid composition of photographic plates for offset lithography and similar processes. One of the later developments for speeding the production of printed material and reducing its cost is the art of phototypesetting. Phototypesetting is now coming to the forefront as a major technology for composing printed material for the graphic arts.

There have been many proposals and many successful commercial machines. They are generally classified into two classes. There are high-speed text composing machines, and much slower headline, or display size typesetting machines. This second group of machines is used for the relatively large headings and display size emphasis words.

SUMMARY OF THE INVENTION

The teaching of the specification herein is that of selecting one of two branch optical systems. Thus, the machine is a dual function machine in part. By diverting the image normally focused in text composition and enlarging the image onto a narrow web with spacing between each character, display size composition of very long extent may be composed. The machine is capable of shifting between display and text composition will.

DESCRIPTION OF THE PREFERRED EMBODIMENT

U.S. Pat. No. 2,486,406 and the prior art patents cited thereagainst illustrate an early version of a photographic typecomposing machine wherein a revolving disc carries the matrix characters to be photographed.

There has been much development work in the past decade in the art of photocomposition, both in the composition of text as substantially all of the high speed composition machines produce, and in display type equipment. An example of a well-known popular display size production machine is Hecker et al U.S. Pat. No. 3,643,558. This machine is of the type that employs a large circular disc, much larger than the test-composing-spinning disc of the photocomposition machines, but has a very similar appearance in that a font of characters is positioned around the periphery of the disc and bears the matrix characters to be photographed. Actually, however, the photography is contact photography and a long strip of photosensitive paper is advanced through a station wherein it is positioned under the peripheral track of the disc font. The appropriate character is rotated into position in the exposure station and a light source is activated to expose the strip of photosensitive paper with the character thus selected. Thereafter the web is advanced another step until finally the entire display composition is completed.

The only limitation on length of a display composition is the length of a roll of web paper, whereas the normal machine composes in lateral lines across a sheet of approximately 8 inches width and then the sheet is leaded one line and another line of text is composed.

Hence, any large display composed in this manner would be limited to about 8 inches.

To simply turn the paper magazine to the horizontal position and compose in one line without lateral spacing, would be wasteful of the wide strip of paper available for text composure, and usually the optics of such a photocomposition machine are incapable of sufficient enlargement within the same dimensions of the machine that will produce text. In short, the inefficiences and problems are much too great for the normal use of one machine in both text composition and large display composition.

The single FIGURE of the drawing illustrates the invention in schematic arrangement, because the details of photocomposition or photographic type composition machines are sufficiently old and well-known that they need not be set forth in detail, and will be well understood by those skilled in the photocomposition art.

A disc **10** is illustrated as the matrix character source, and although modern photocomposition disc fonts are much more complex with many more characters than the original composition machines, the function of disc **10** is essentially that of a rotating transparency font just as in the above-referenced early photographic type composition machine.

In the known phototypesetting machines, the selection of the character and the flashing of an illumination source **12** is accomplished by means of a computer **13.** The computer **13** may also be used to control other functions of photocomposition but its primary purpose is to find and project an image of a proper character from the disc **10.**

The commonly used character source is a transparency disc, but those skilled in the art may desire to select a transparent disc with opaque characters or an entirely opaque character with a reflex illumination of characters done in a contrasting color on the surface of the disc. Hence, the invention is not confined to a transparent disc **10,** but any original object holder and means to illiminate an object positioned on that holder.

There are many known ways to bring the optical image of the original object on the holder into focus upon a photosensitive film or sheet, and the figure of the drawing has been selected to illustrate a type of structure which employs a compensator lens **14** together with a collimating and de-collimating lens set. The compensator lens **14** is a primary lens positioned to gather light rays from the illuminated object and form an aerial image **16** of the object at the focal length of the lens **14.**

This invention provides a dual optical and printing system. Therefore, a first composing system comprises a collimating lens **18** and a de-collimating lens **20** optically coupled. This type of optical system is taught by prior art U.S. Pat. No. 2,670,665 and others before it.

The purpose of the collimating and de-collimating lenses, as taught by U.S. Pat. No. 2,670,665 is to permit a composition by shifting the de-collimating lens **20** after each exposure of a character in order to provide letter spacing. In order to space the exposed letters one after the other in a line series, a mirror **26** is placed in the optical axis of the de-collimating lens **20** and the image directed at a right angle to the optical path. Then, by stepping the lens and the mirror together along the optical axis of the collimating lens **18,** the letters are stepped along in a line composition on the plane in which a sheet of photosensitive material **28** is

positioned. Normally the sheet **28** is a coated light-sensitive paper fed in leaded steps by a film cassette. Thus, a line is composed by stepping the lens **20** and the mirror **26** from left to right until the line is filled, and then returning while the film cartridge leads the photosensitive paper **28** one line.

It is also a known technique to compose by using a pivotally mounted mirror. The depth of focus of the lens system will accommodate the differences in focal path along a line of composition due to stationary mirror position, but perfect focus is possible by computer control of the de-collimating lens position to reposition the de-collimating lens for each character composed. Also, the paper field may be curved.

The composition escapement in the preferred embodiment is accomplished by means of a rack **30** attached to a holding bracket **31** on which the lens **20** and mirror **26** are mounted. A pinion **32** is driven by a motor **34** to step the carriage **31** along in proper escapement dimensions. Usually the motor **34** is a stepper motor which is also controlled by the computer **13.**

A second photocomposing system is established by the provision of a negative lens **36** into the optical system to branch off to a separate photosensitive sheet. The normal path of the lens **20** and mirror **26** is the extent that reflection from mirror **26** will fall upon the large sheet **28.**

The frame **31** is shiftable by the motor **34** under control of the computer to a parked position shown in full line in the drawing. Composition in this mode is achieved solely by paper movement and not by stepping of the mirror.

The first optical system is composed of lenses and a mirror to produce text of point size within a range covering a bulk of normal composition. The second branch may be maintained in the same point size to produce long strips of text, but usually a lens will be inserted to change the point size, and the most common use is to insert a diverging lens to produce large display size composition.

What is claimed is:

1. A convertible phototypesetter and display size type printing machine, comprising:

an orginal object holder and means to illuminate an object positioned on said holder;

a compensator lens, this lens being a primary lens positioned to gather light rays from said illuminated object and form an aerial image of the object at the focal length of the lens;

a first composing system, comprising:

1. a collimating and a de-collimating lens optically coupled;
2. means for shifting the lenses as a cooperative system to produce point size variations of print;
3. a mirror in the optical path of said de-collimating lens for bringing the image produced by said compensator, collimating and de-collimating lenses to focus on an image plane lateral to said optical path;
4. a drive system for stepping said mirror through a limited excursion in said optical path for spacing successive images in a series to produce a line of composition;

a second composing system, comprising:

said paragraph (**4**) drive system extended to shift said mirror of paragraph (**3**) beyond the said limited distance to a fixed position wherein the optical path misses said image plane; and

a secondary mirror system to project said image onto an image plane separate from said first composing system; and

means to step a web of photosensitive material in said image plane after exposure of each character to produce a single line of composition of unlimited length.

2. A convertible phototypesetter as defined in claim **1,** wherein a lens is positioned in the optical axis of the secondary mirror system to alter the print-out image size on said web of photosensitive material.

3. A convertible phototypesetter as defined in claim **1,** wherein a diverging lens is positioned in the optical axis of the secondary mirror system to enlarge the print-out image size on said web of photosensitive material.

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