April 29, 1969 L. M. MOYROUD 3,440,937

PHOTOGRAPHIC COMPOSITION APPARATUS

Filed Feb. 23, 1967 Sheet 1 of 2

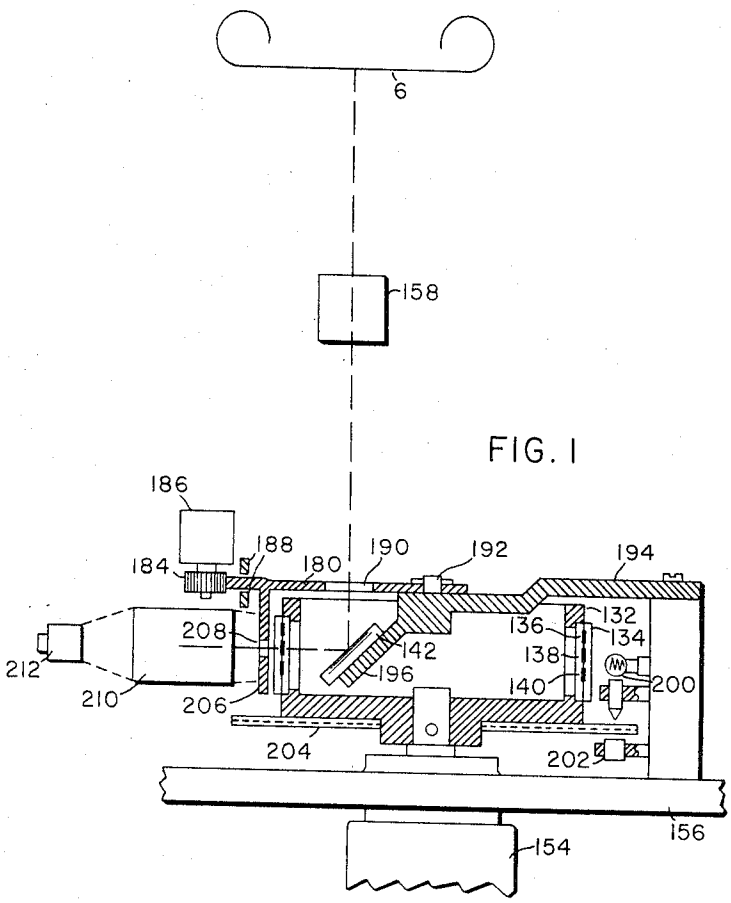


FIG. 1

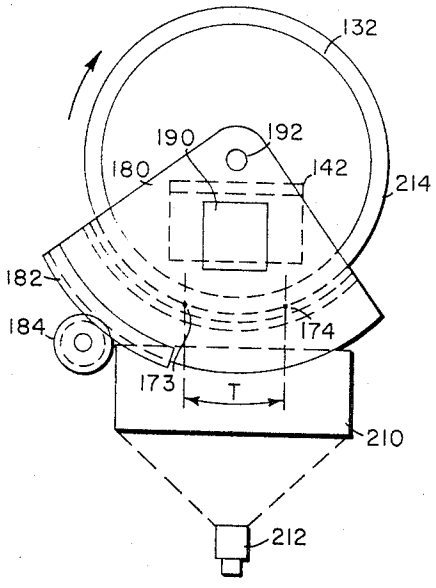


FIG. 2

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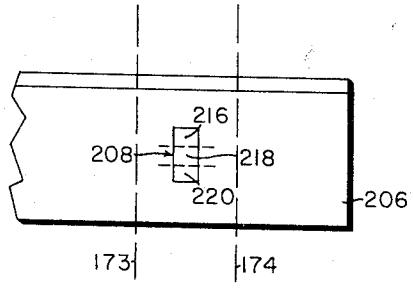


FIG. 3

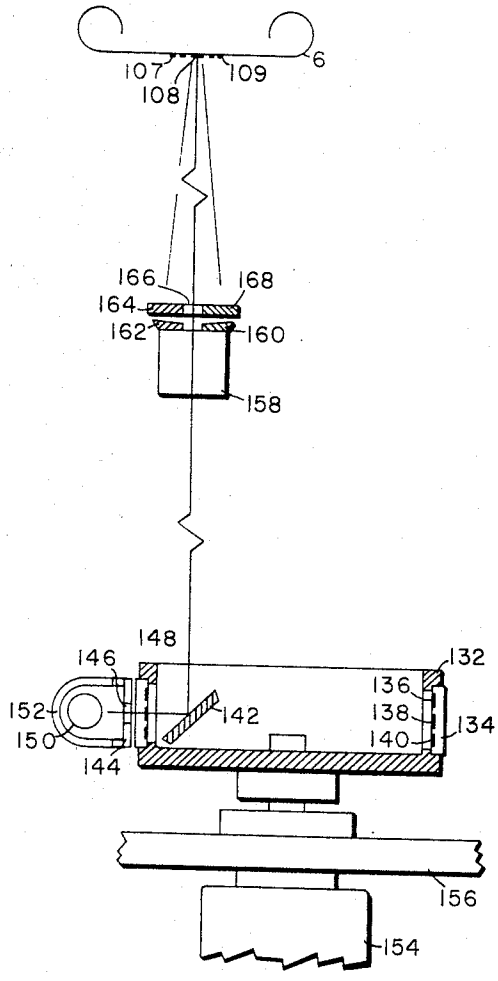


FIG. 4

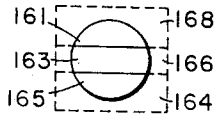


FIG. 5

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PHOTOGRAPHIC COMPOSITION APPARATUS

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Continuation-in-part of applications Ser. No. 441,738, Mar. 22, 1965, and Ser. No. 506,936, Nov. 9, 1965.
This application Feb. 23, 1967, Ser. No. 618,048
Claims priority, application Great Britain, Feb. 22, 1966, 7,752/66
Int. Cl. B41b *13/00, 17/00*
U.S. Cl. 95—4.5
5 Claims

ABSTRACT OF THE DISCLOSURE

A phototypesetter wherein the characters are carried on a continuously rotating matrix drum. Characters on the matrix are selectively illuminated by means of an external light source and an arcuate mask located close to the periphery of the matrix drum. The characters to form a line are selectively illuminated, deflected vertically by a mirror located within the drum and imaged on the film by a field flattening optical system.

Cross reference to related applications

This application is a continuation-in-part of my co-pending applications Ser. No. 441,738, filed Mar. 22, 1965 and Ser. No. 506,936 filed Nov. 9, 1965.

Brief summary of invention

This invention utilizes a continuously rotating matrix similar to that disclosed in my copending application Ser. No. 441,738. However, instead of the limited projection area as disclosed therein the projection area of the present invention is much enlarged to a sufficient length so that a whole line may be projected without any mechanical translation of the optical system. This is due mainly to: (1) the unique arcuate mask which serves to mask all but the selected character throughout the entire arc of the projection area; (2) the optical system which has the unique characteristic of imaging the concave arc of the projection area as a straight line at the film plane.

Thus one of the objects of this invention is to provide a phototypesetter which requires no mechanical translation of the optical system.

Another object of this invention is to provide a means for photographically composing typographic images on photographic film or paper at extremely high speeds.

Still a further object of this invention is to provide a high speed phototypesetter which can be manufactured at a relatively low cost.

A further object of this invention is to provide a means for very rapid mixing of several type faces within a line having a common baseline.

The invention itself, both as to its organization and method of operation, as well as additional objects and advantages thereof, will become more readily apparent for a reading of the following description in connection with the accompanying drawings.

Briefs description of the drawings

In the drawings:

FIG. 1 is a cut away view of a preferred embodiment of the invention.

FIG. 2 is a top plan view of the embodiment shown in FIG. 1.

FIG. 3 is a view showing a portion of the arcuate shield with electro-optical shutter elements in the window opening.

FIG. 4 shows another embodiment of the invention.

FIG. 5 shows an enlarged view of the electro-optical shutter elements associated with the optical system as shown in FIG. 4.

Detailed description of the invention

In the preferred embodiment of this invention shown in FIG. 1 the characters of the matrix are transparent on opaque background and are attached to a continuously rotating drum **132**. This drum is provided with apertures which receive matrix segments **134**.

In this embodiment the drum carries three rows of characters of different styles or faces **136**, **138** and **140**. Each row can contain one or more complete alphabets and certain frequently used characters can also be repeated several times as explained in my Patent No. 3,291,015. The drum is continuously driven by a motor **154** secured to the base **156** of the machine. A timing disc **204** is secured to drum **132** to generate pulses as it intercepts a light beam generated by the exciter lamp arrangement **200** associated with photocell **202**. The signals generated by this arrangement serve to generate a pulse everytime a character moves past a fixed position as described in my aforesaid Patent No. 3,291,015. Also, as explained in the aforementioned patent a certain area of the matrix can be illuminated for very short instants by a flash lamp **212** associated with an optical condensing system **210**. The light emitted by the flash lamp is limited to an area slightly larger than the largest character by an aperture or window **208** cut out in the arcuate mask **206** mounted on axially pivoted member **180** acting like a shield or shutter to prevent the projection of unwanted characters. Member **180** is axially pivoted at **192** on the fixed extension **194** of the frame of the machine. It is also supported at the other end by arcuate rails schematically shown at **188**. Member **180** is provided with a gear segment **182**, see FIG. 2, engaged by pinion **184** of a stepping motor **186**. Aperture **208** is periodically moved, as explained in the aforesaid patent.

The beam of light emerging from the selected character is deflected by a mirror **142** to an optical system **158** to a light receptive surface **6**, which can be a photosensitive film or a heat sensitive plate material. The optical system **158** is so designed as to compensate for the curvature of the matrix in the projection area. This area is limited by lines **173** and **174** which define a projection area T. The length of the matrix in the projection area T is projected as a straight line of the same length T, multiplied by the enlargement ratio of the optical system **158**. The mirror **142** can be pivoted around a fixed axis in order to select a specified matrix row or it can be attached to a fixed extension **196** of the machine frame, as shown in FIG. 1.

The details of the control circuit have not been described in this because such control circuit is identical to that described in my Patent No. 3,291,015. It is assumed that the control circuit will accept either punched paper tape or computer generated magnetic tape. Alternatively, the control circuit described in my copending application Ser. No. 441,738 with slight modifications which will be obvious to those skilled in the art can be used.

The window aperture of the preferred embodiment is shown in detail in FIG. 3. It is made large enough to expose all three levels of character rows **136**, **138** and **140** on the matrix. In order to limit the light to only one of the three rows area **216**, **218** or **220** is selectively illuminated preferably by use of an electro-optic material commercially known as "Varad" whose transparency can be varied from complete transparency to opaque by the application of electrical current. Alternatively, the light transmission area of the aperture **208** can be limited by means of a shutter movable in a direction at right angles to the displacement of shield **206** as described in my co-pending application Ser. No. 441,738.

In FIG. 4 the light source **150** which can be a relatively small flash tube such as an E.G. & G. FX78 flash tube. This tube is shown mounted in a reflector housing **152** which is mounted directly on the arcuate shield directly in front of the window opening **146**. This arrangement has certain advantages in that light is directed to the character without the necessity of an elaborate and expensive optical condensing system.

Any selected character row must be projected to a common base line on film **6** for "in line" mixing. This can be achieved by the selective insertion of optical wedges or other beam deflecting devices either between matrix drum **132** and optical system **158** or between the latter and the image plane. FIGURE 4 shows an embodiment wherein two optical wedges **160** and **162** are located at the exit end of optical system **158** for the purpose of projecting on the same common base line **108** on film **6** any of the different type faces of rows **136, 138** or **140**. It is evident that in this example only one-third of the emerging light is utilized. As the optical system **158** and its associated wedges would make three images of each character row, shutters **164, 166** and **168** are associated with each three lens areas in order to abturate any of these areas shown at **161, 163** and **165** in FIG. 5.

I claim:

1. In a photographic type composing machine a character projector comprising a continuously rotating drum, a matrix strip having light transparent characters formed in an opuaqe background mounted around the periphery of said drum, an intermittent light source located outside the drum in position to illuminate a portion of the matrix strip, a mirror within the drum positioned to direct the light rays passing through the transparent characters along a path substantially parallel to the axis of the drum, a lens positioned in said parallel path, an image plane, said lens being effective to focus the light rays so that the image of the transparent characters is formed in the image plane, a window slightly wider than the maximum width of any character on the matrix, means to move the window through an arcuate path substantially concentric to the drum, means to position said window to any one of a plurality of positions along said arcuate path and means

to actuate said intermittent light source whenever a selected one of the matrix characters appears within the window thereby causing the image of said character to be projected to the image plane.

2. The combination as in claim **1** wherein the window comprises an opening formed in an arcuate member and a support member effective to support said arcuate member in a position substantially concentric to the axis of the drum.

3. The window as in claim **2** wherein the support member is mechanically pivoted at the axis of the drum.

4. The window as in claim **2** wherein the opening contains a three section electro-optical shutter, said sections each comprising rectangular areas adjoining each other in a vertical row, operative means effective to selectively cause any one of said sections to switch to its transparent state.

5. The combination as in claim **1** wherein the characters are arranged upon the matrix in more than one row, said rows being concentric with the axis of the drum and all equidistant from said axis vertically spaced from each other, and wherein said path of the light rays parallel to the axis has located therein one or more optical wedges, the number of said optical wedges being equal to the number of character rows on the matrix minus one, said wedges each effective to deflect the light rays passing through it to a common area in the image plane so that the images of the characters in each row are coincident, electro-optical shutters one for each row of characters on the matrix effective to allow only one of the rows to be projected at one time, said electro-optical shutters being located in close association with the said optical wedges.

References Cited

UNITED STATES PATENTS

3,134,090	5/1964	Blakely	95—4.5
3,252,392	5/1966	Ward	95—4.5

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