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[33] **Great Britain**

[31] **42,117/68**

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[56]

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Primary Examiner—John M. Horan

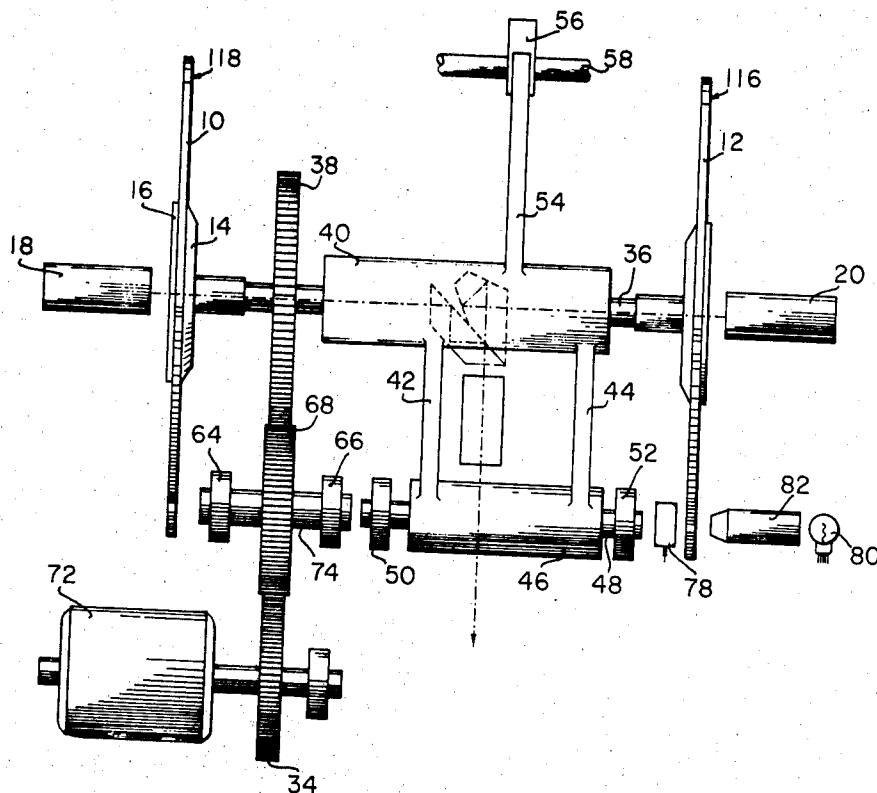
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[54] TYPE-COMPOSING MACHINES

2 Claims, 3 Drawing Figs.

[52] U.S. Cl.....	95/4.5
[51] Int. Cl.....	B41b 21/24
[50] Field of Search.....	95/4.5

ABSTRACT: A photocomposing machine includes a pair of interchangeable discs removably mounted for rotation on a common shaft, a pair of prisms which act as a beam splitter for merging character images from each disc along a common optical path, the prisms also being designed such that all images have a single orientation when they arrive at an image-receiving surface, a lens turret for changing size, and a style-shifting mechanism which moves the discs in unison. In addition, a lens positioned in the optical path between the prisms and the lens turret is adapted to form a first (or intermediate) aerial image of each projected character prior to the character image being focused on the image-receiving surface.



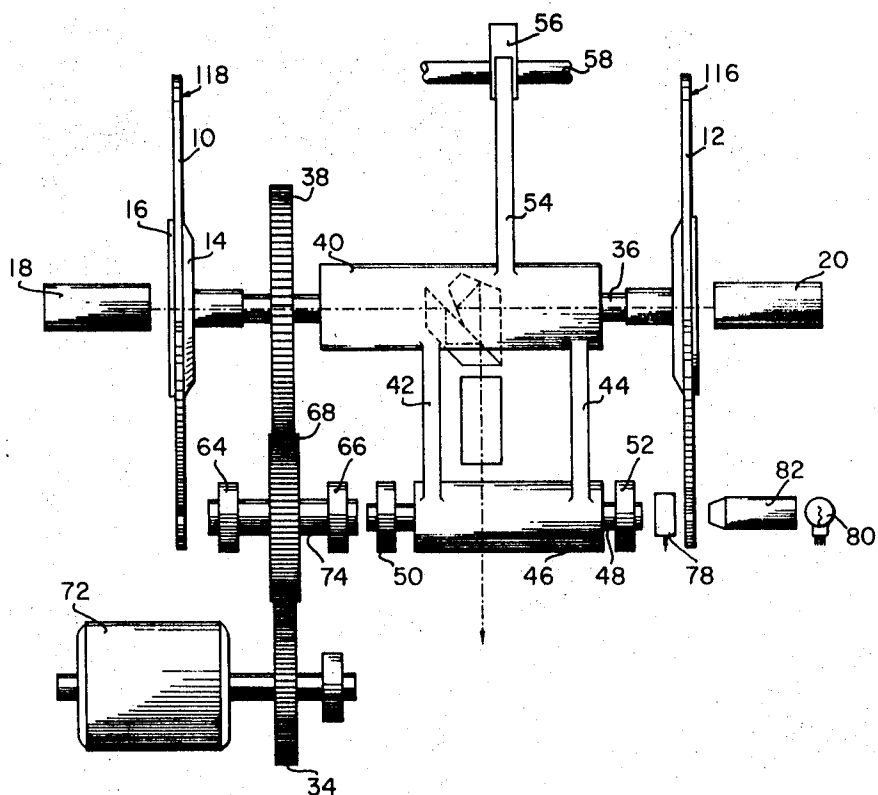


FIG. 1

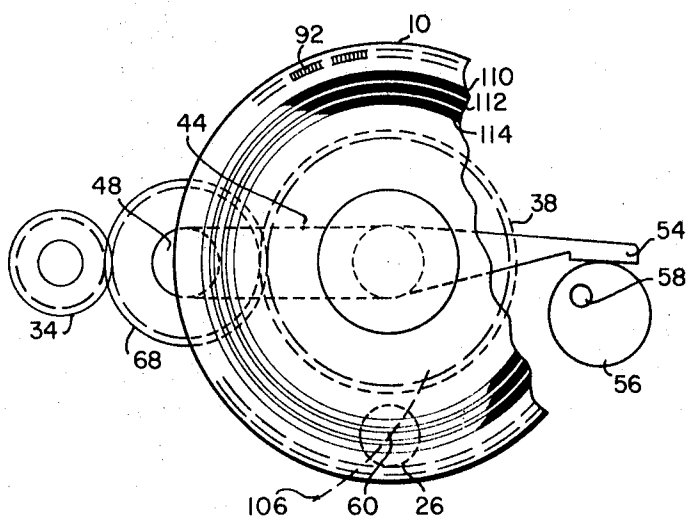
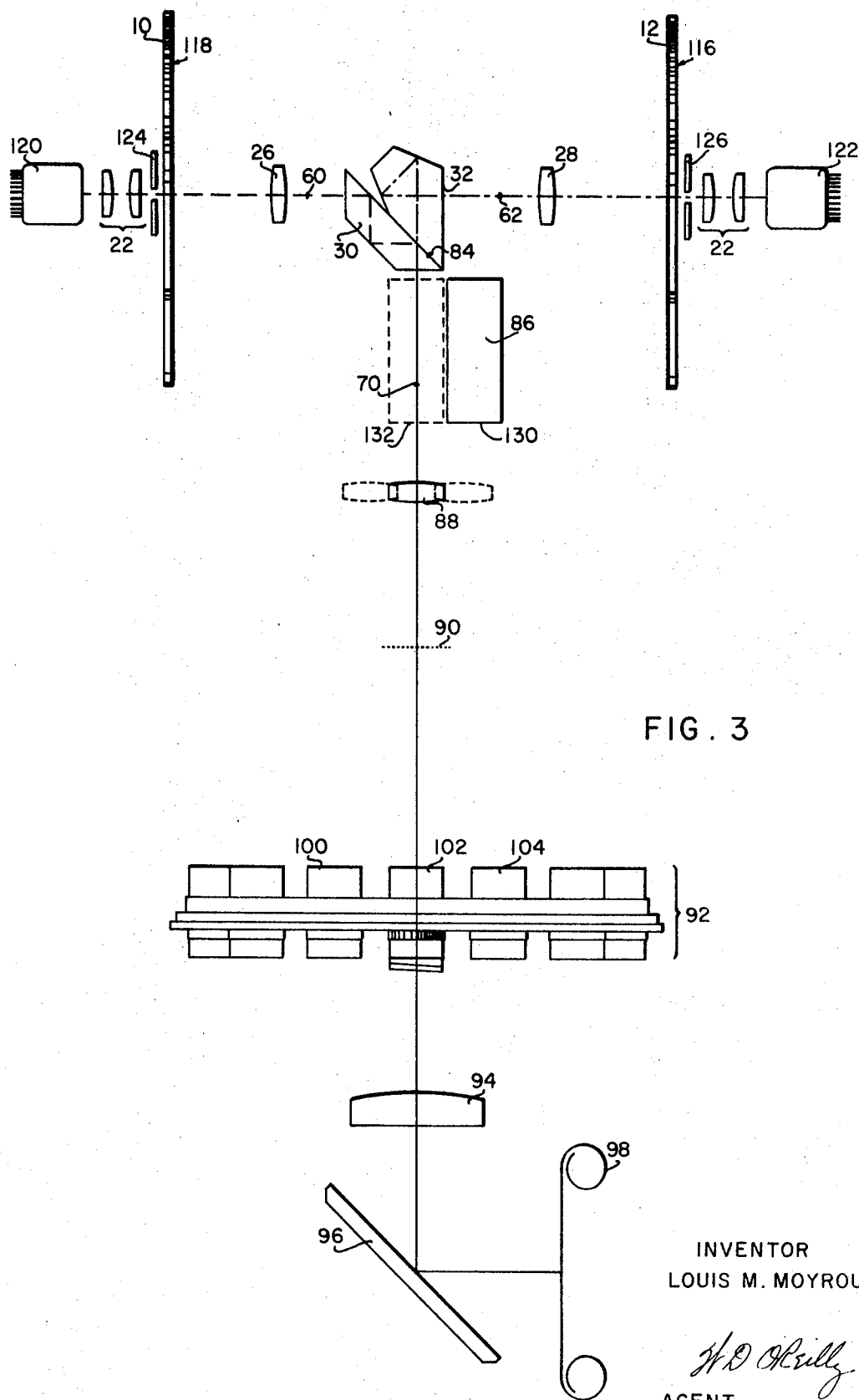


FIG. 2

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TYPE-COMPOSING MACHINES

This application is a continuation-in-part of U.S. Ser. No. 726,129 filed May 2, 1968. The disclosures of U.S. Pat. Nos. 2,951,428 and 2,670,665 are expressly incorporated by reference into the present application.

This invention relates to improvements to photographic type-composing machines in which master characters are positioned on matrices which are interchangeable with one another.

The improvements relate more specifically to machines as described in U.S. Pat. Nos. 2,951,428 and 2,670,665 but are not limited to these machines.

The present invention makes it possible to double the type face capability as well as the number of available sizes in a machine as described in said U.S. Pat. No. 2,951,428. This invention will be more fully described in the detailed description which follows, in which:

FIG. 1 is a side view of the rotatable discs mounted on a common shaft, together with the drive gears of the machine;

FIG. 2 is a partially broken detailed view of a disc, together with the style-shifting mechanism; and

FIG. 3 is a schematic top plan view of the optical system of the machine.

Referring to FIG. 1, the matrix characters are located on two rotatable character carriers such as discs shown at 10 and 12. Each disc is preferably comprised of a plate bearing transparent character shapes on an opaque background sandwiched between two holders 14 and 16. These holders can be easily disassembled so that the "inside" holder 14, provided with a hub, can be positioned either against the face of the disc containing the character shapes, or against the noncharacter face of the disc. The purpose of this arrangement is to make the discs interchangeable; that is, to make it possible to use a disc at either of the two positions shown so that the face bearing the character shapes (called the emulsion side) of each disc is facing the same direction, to the right or to the left, as depicted in FIG. 1 where the emulsion side of disc 10 is shown at 118 and the emulsion side of disc 12 is shown at 116. Each disc is, as described in U.S. Pat. No. 2,951,428 provided with a row of timing slits 92 (see FIG. 2) and a plurality of character rows schematically represented at 110, 112 and 114. Each disc is removably attached to a common shaft 36 which is keyed to a gear 38. Shaft 36 is rotatably mounted in sleeve 40 supported by two arms 42 and 44 extending from a second sleeve 46 rotatably mounted on a fixed shaft 48. Shaft 48 is supported by two fixed bearings 50 and 52.

The above assembly may be rotated about the axis of the shaft 48 by an arm 54 integral with the sleeve 40, the arm 54 cooperating with a cam 56 rotatable to a number of fixed positions about a fixed shaft 58. Coaxial with the shaft 48 is a shaft 74 supported by a pair of fixed bearings 64 and 66. Shaft 74 is keyed to an idler gear 68, driven by a pinion 34 continuously rotated by a motor 72.

A photoelectric cell 78 is supported in a fixed position substantially within the axis of shafts 48 and 74 and receives light through slits 92 of the disc, the source of light preferably comprising a light source 80 and a lens 82. A photoelectric system as described is associated with each disc.

Flash assemblies 18 and 20 respectively, are also associated with each disc. Each assembly is located on the common projection axis 60 of the two discs (see FIGS. 2 and 3). As the disc arm 44 is pivoted around the axis of shaft 48 by cam 56, different character rows are brought on axis 60 as characters in projection position move along arc 106 (as described in said U.S. Pat. No. 2,951,428) thus comprising a mechanism for shifting from one style to another on each of the character carriers 10 and 12.

The optical system is more clearly depicted in FIG. 3. In this figure, means for selectively illuminating characters, such as flash lamps, are shown at 120 and 122. Each lamp is preferably associated with a condensing system 22. Windows 124 and 126, in fixed positions, are associated with each disc

to limit the illumination produced by the flash lamps to one character area. Collimating lenses 26 and 28 are associated with each disc as shown.

An optical merging system comprised of means for reorienting images and means for merging the images along a common path is located between the two discs for the purpose of "mixing" the images produced by either disc and to deflect the character forming light rays by 90°. In FIG. 3 the optical merging system comprises two prisms 30 and 32. One prism has an even number of reflections and the other prism an odd number of reflections, in order to reorient the character images properly so that characters originating from either disc will have the same orientation on the film. The common prism face 84 is half reflecting and acts as a "beam splitter" in order to merge the character images along common path 70.

After passing through the prism assembly, light beam 60 (originating from order and light beam 62 (originating from disc 12) and merged along a path 70, which is also the optical axis of the imaging system of the machine. An afocal "magnifier" 86 may be mechanically moved from position 130 to a second position 132 in order to intercept the light rays and thus change the magnification ratio of a first or intermediate aerial image of the characters produced at position 90 by an imaging lens 88. A field lens (not shown) is preferably located in this intermediate image plane. The light beams emerging from the field lens are directed to one of a plurality of lenses such as 100, 102, 104 mounted on a lens turret as explained in U.S. Pat. No. 2,951,428, in order to change the size of the images. The light emerging from the turret lenses is directed to a character image spacing means such as a travelling lens 94 and a mirror 96 (as described in U.S. Pat. No. 2,670,665) after which the character images reach a sensitized surface (such as a film) 98. The style of these character images will depend on the flash lamp fixed (i.e., upon which disc is selected), or the position of the row selecting cam 56. Their sizes will depend on the position of the lens turret 92, and also on the position of the "multiplier lens" 86.

Thus, with the addition of an extra disc mounted on the same shaft an existing disc in a machine of the type described, together with the addition of one lens, it is possible to double the number of different type faces and double the number of different point sizes (image sizes). For example, in a machine commercially known as Photon Model 200 or 560, having a photo unit basically as described in said patents, it is possible, at low cost, to increase the number of available type faces from 16 to 32 and the number of sizes from 12 to 24. In addition, as characters from the same row of each disc are optically merged, twice as many characters are in projection position during a given time as in previous machines. It is also possible to flash at a fixed location on the film both flash lamps for special characters. For example, one disc can have accents and the other the characters to be accentuated.

In U.S. Pat. No. 2,670,665, all character spacing on the film is accomplished by a travelling carriage identical to that designated by numerals 94 and 96 in FIG. 3. However, there are many instances in which the rather cumbersome carriage complicates the task of effecting minute or fine increments of character spacing. In this invention carriage movement and character spacing are facilitated by reducing the number of steps the carriage has to move in order to space characters. This is accomplished by distributing the task of properly spacing characters among three elements: the carriage is responsible for "coarse" spacing, lens 88 is responsible for "fine" spacing, and "very fine" spacing is accomplished by delaying the flash of the flash lamps within very narrow limits.

The operation of the foregoing arrangement will be illustrated by the following example: Assume that a $7\frac{1}{2}$ relative units character (based on "fractions" or units of an EM) is to be projected in nine-point (size) onto film 98. Assume further that the flash can be delayed, in increments or "steps" of one-half units, a maximum of $1\frac{1}{2}$ relative units, that lens 88 can move a maximum of ± 3 relative units (one step per unit) without encountering light vignetting, and that each carriage

step equals 64 elementary width units (e.w.u.) or absolute units. In order to properly space this character, 67.5 (9×7.5) units of spacing must occur. If the carriage is moved one step (64 units), and the lens 88 is moved three steps (one unit per step), then the remaining one-half unit of spacing is achieved by flash delay of one "step." It is apparent from this example that the task of spacing has been simplified, since the carriage movement can be confined to relatively large, "coarse" incremental movements, while the relatively "fine" spacing is accomplished by less cumbersome components. This arrangement, of course, could further increase the speed of composition of the machine.

The foregoing description is intended to be illustrative only. Various changes or modifications in the disclosed embodiments may occur to those skilled in the art. It is understood, therefore, that all such modifications as would be apparent to one skilled in the art are included within the scope of the present invention.

I claim:

1. A photocomposing machine comprising:

a pair of discrete, rotatable character carriers, each of said character-carriers having a multiplicity of characters positioned thereon, said character carriers being mounted for rotation about a common axis,
means for moving both of said character carriers in unison

for the purpose of shifting from one style to another on each of the character carriers,
means for selectively illuminating characters on each of said character carriers,

a sensitized surface for receiving images of selected characters projected from each of said character carriers, the character images projected from one of said character carriers having a first orientation, and the images projected from the other carrier having a second orientation, optical means for reorienting the character images projected from one of said character carriers, in order that all of the images projected onto said image-receiving surface will have a single orientation,

said reorienting means including means for merging said character images along a common path,
means for changing the size of said merged character images, and

means for spacing said images on said image-receiving surface in order to form lines of composition thereon.

2. The machine of claim 1 in which said rotatable character-carriers comprise interchangeable discs removably mounted on a common shaft, both of said discs having a plurality of concentric circles of different styles.

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