United States Patent [19]

Sinnott et al.

[11] **3,821,753**

[45] **June 28, 1974**

[54] **MULTIFONT PHOTOCOMPOSING MECHANISM**

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[22] Filed: **July 5, 1972**

[21] Appl. No.: **269,196**

[52] **U.S. Cl.** **95/4.5**

[51] **Int. Cl.** **B41b 21/28**

[58] **Field of Search** 95/4.5

[56] **References Cited**

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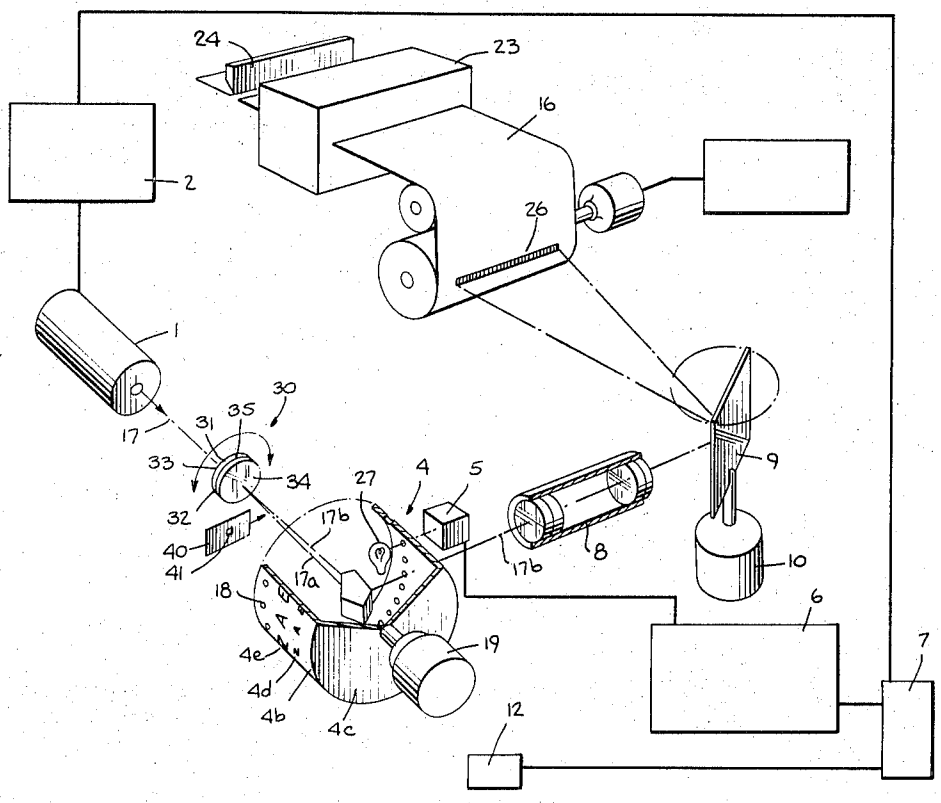
[57] **ABSTRACT**

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.

18 Claims, 7 Drawing Figures



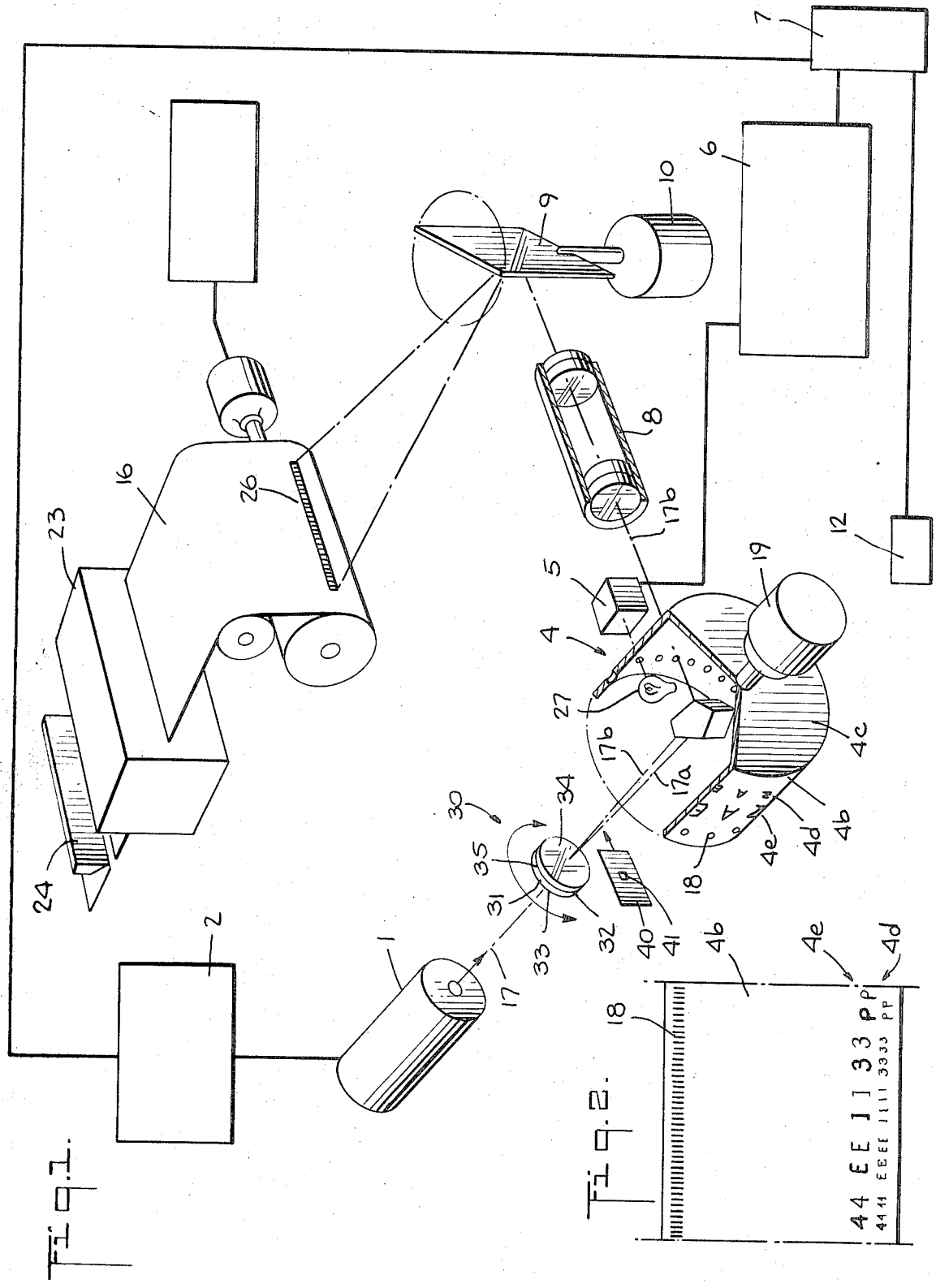

7
6
10
9
8
16
26
23
17b
12
19
5
4
27
4c
17a
30
34
35
31
33
32
40
41
4b
4d
4e
18
24
2
1
17

Fig. 1.

4b
4e
4d
18
44 EE 11 33 PP

Fig. 2.

Fig. 3.

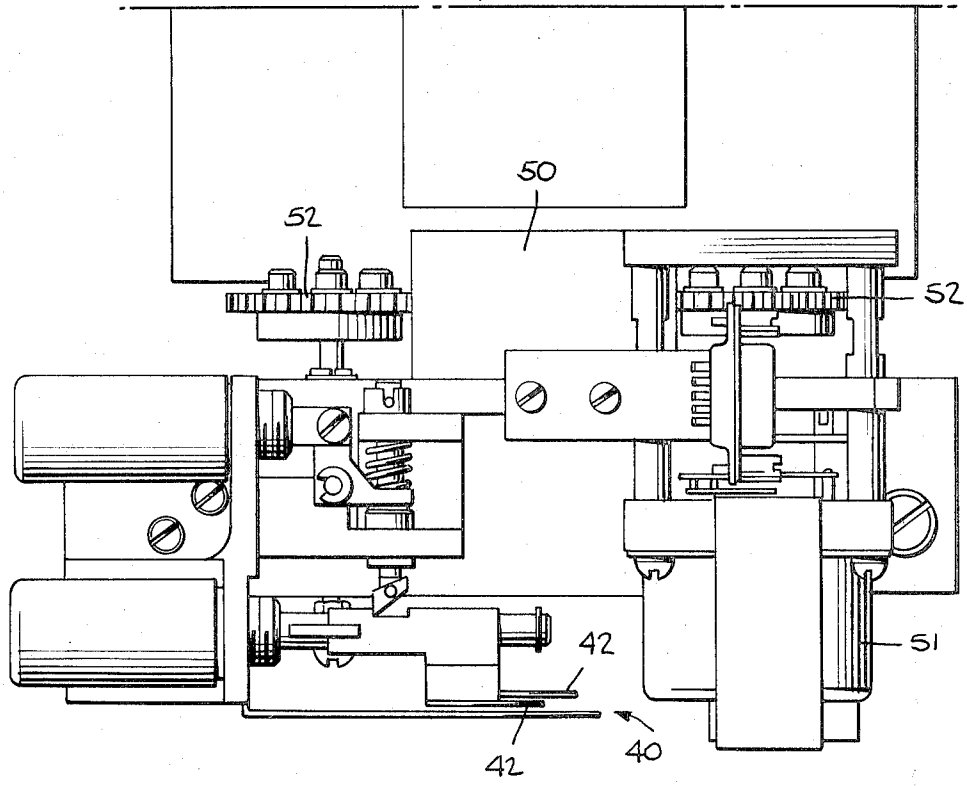


Fig. 4.

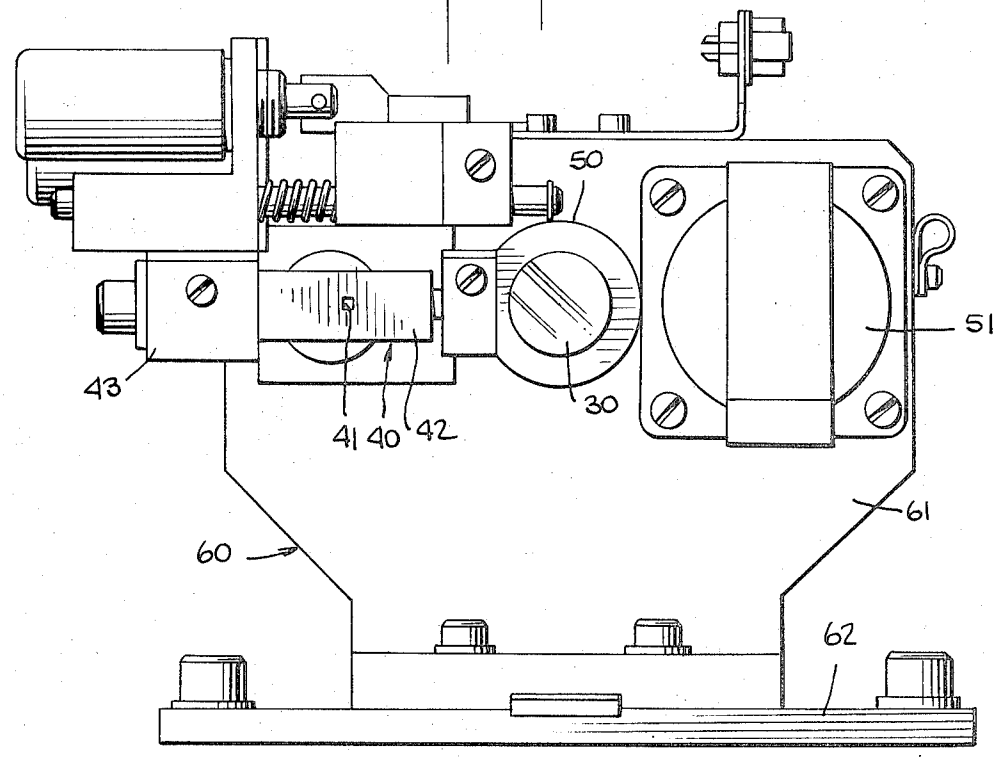


Fig. 6.

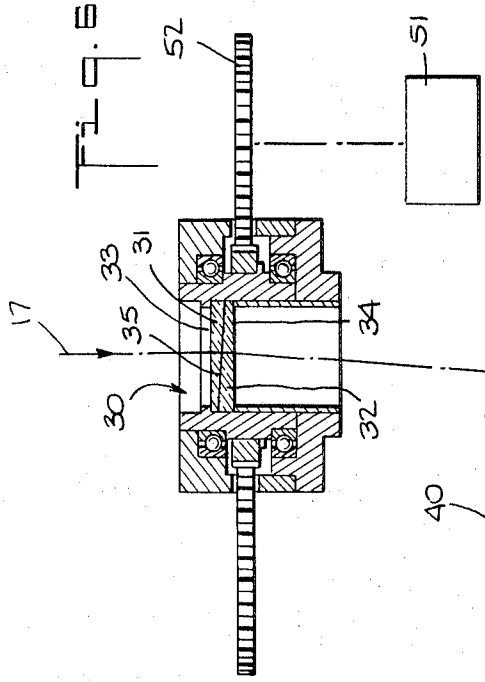


Fig. 7.

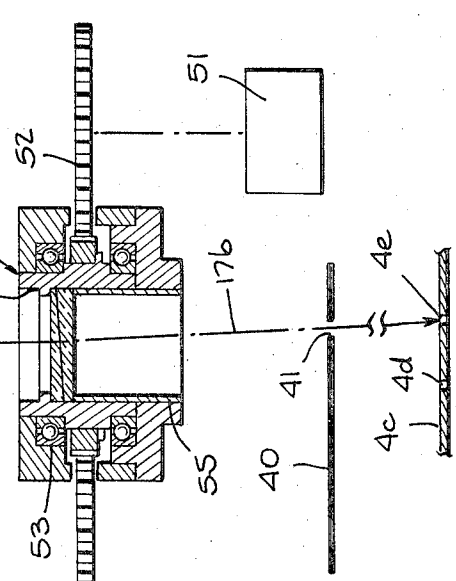
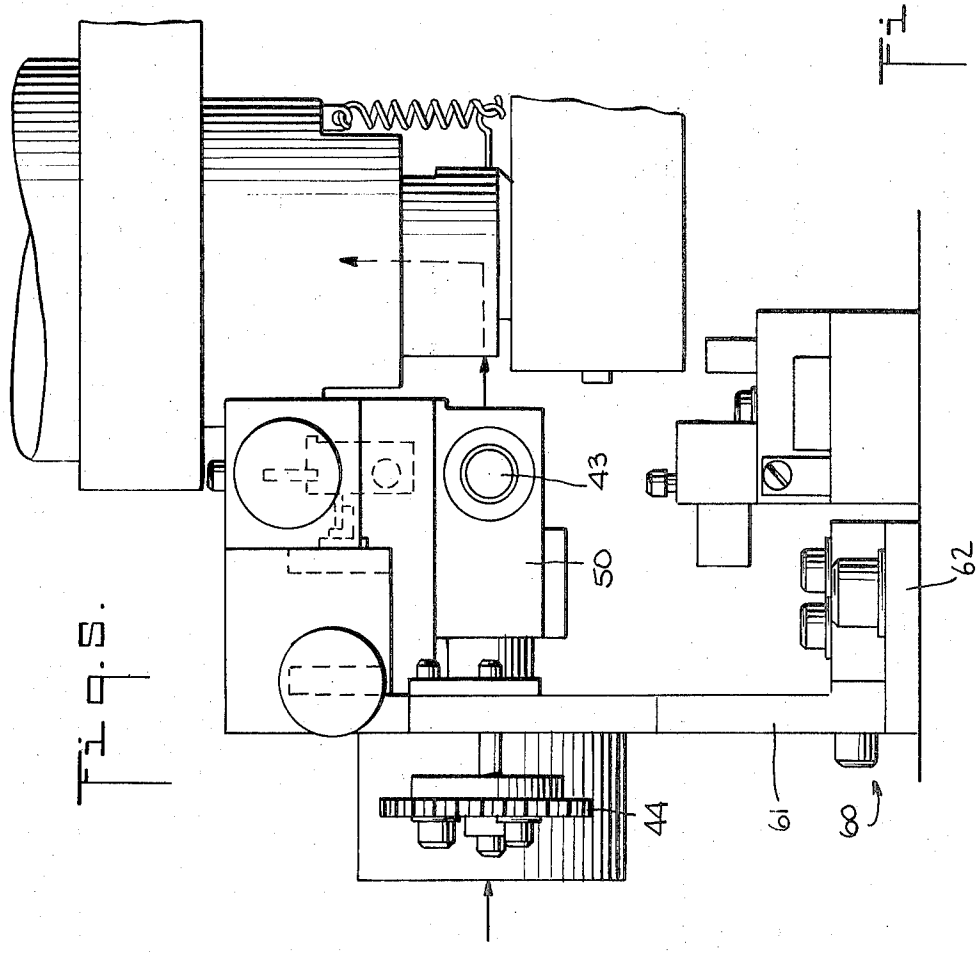


Fig. 5.



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.

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 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. Pat. 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 zeon 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 **4***c*, having a film strip **4***b* consisting of a plurality of fonts of transparent characters **4***e* and **4***d*. 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 **4***b* and the image **17***b* formed of that character is directed to a lens system **8.**

The lens system **8** will direct the character image **17***b* to a reflecting surface **9,** which is shown in the application as a mirror, for reflecting the character image **17***b* onto the photo-sensitive film **16** as at **26.** The mirror **9** is moved by a motor **10** so that the image **17***b* 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 **17***b* 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 **4***d* and **4***e* on the rotating drum film strip **4***b*, there is provided a plurality of counting gate openings **18.** One gate opening **18** is mounted in line with characters **4***d* and **4***e*. The drum **4***c* 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 **4***d* and **4***e* on the single strip **4***b* 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 **4***d* and **4***e*. In the present invention, this has been accomplished by using a refracting optical wedge **30** which directs the beam through either font **4***e* or font **4***d* 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 directface **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 **17***a*. 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 **17***b* in a path which diverges from the path **17***a*.

Hence, the beam **17** may be directed along path **17***a* to pass through a character in font **4***d* or may be directed along path **17***b* to pass through a character in font **4***e* by rotating the wedge **30.** Although two fonts **4***d* and **4***e* 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 **4***d* may be smaller than the font **4***e* so that the field of vision of the beam **17***a* which is directed through font **4***d* 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 **17***a* 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 **4***d*.

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 **4***d* 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 comprises a pair of wedges having angled surfaces.

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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