United States Patent [19]

Heidenreich

[11] **3,916,422**

[45] **Oct. 28, 1975**

[54] **CHARACTER GRID FOR CRT PHOTOTYPESETTING MACHINE**

[75] Inventor: **Karl R. Heidenreich,** Brooklyn, N.Y.

[73] Assignee: **Eltra Corporation,** New York, N.Y.

[22] Filed: **May 9, 1974**

[21] Appl. No.: **468,453**

[52] **U.S. Cl.** **354/19**

[51] **Int. Cl.²** **G03B 17/00**

[58] **Field of Search** 355/75; 354/6, 11, 17, 354/19

[56] **References Cited**

UNITED STATES PATENTS

3,204,520 9/1965 Grube 354/11

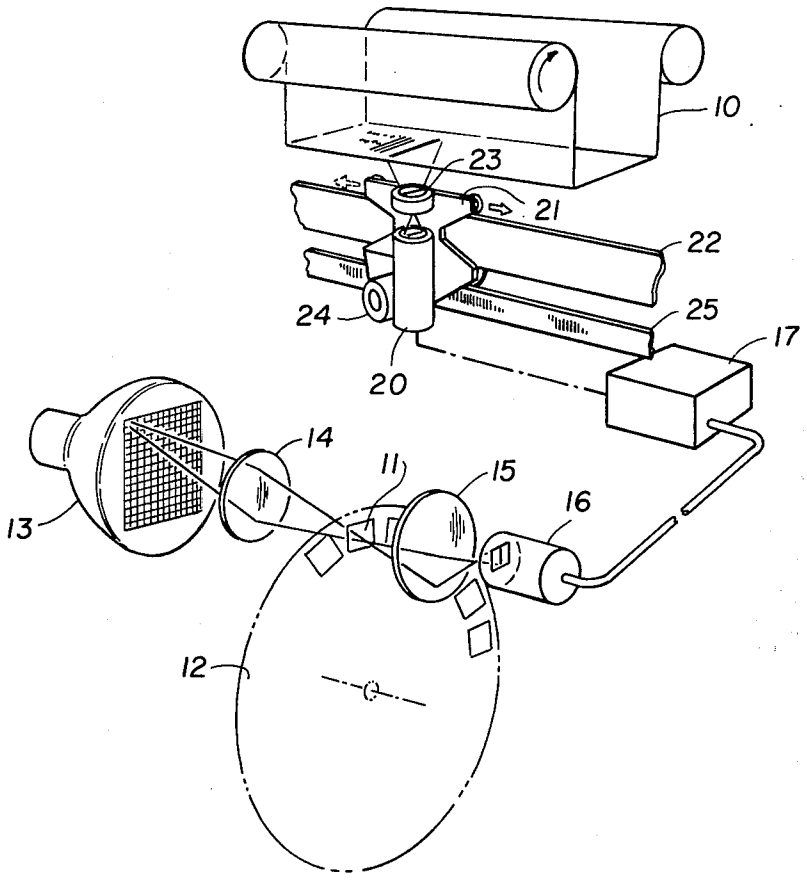
Primary Examiner—John M. Horan

Attorney, Agent, or Firm—William P. Keegan

[57] **ABSTRACT**

A photographic character grid for storing characters to be scanned to generate signals suitable for setting the scanned characters in a CRT phototypesetting apparatus. The character grid comprises a font element on which the characters are photographically recorded and a frame member to which the font element is loosely secured. Because of the loose connection between the font element and the frame member, the font element can be aligned accurately in the phototypesetting apparatus and thereafter clamped into the aligned position by the frame member.

3 Claims, 6 Drawing Figures



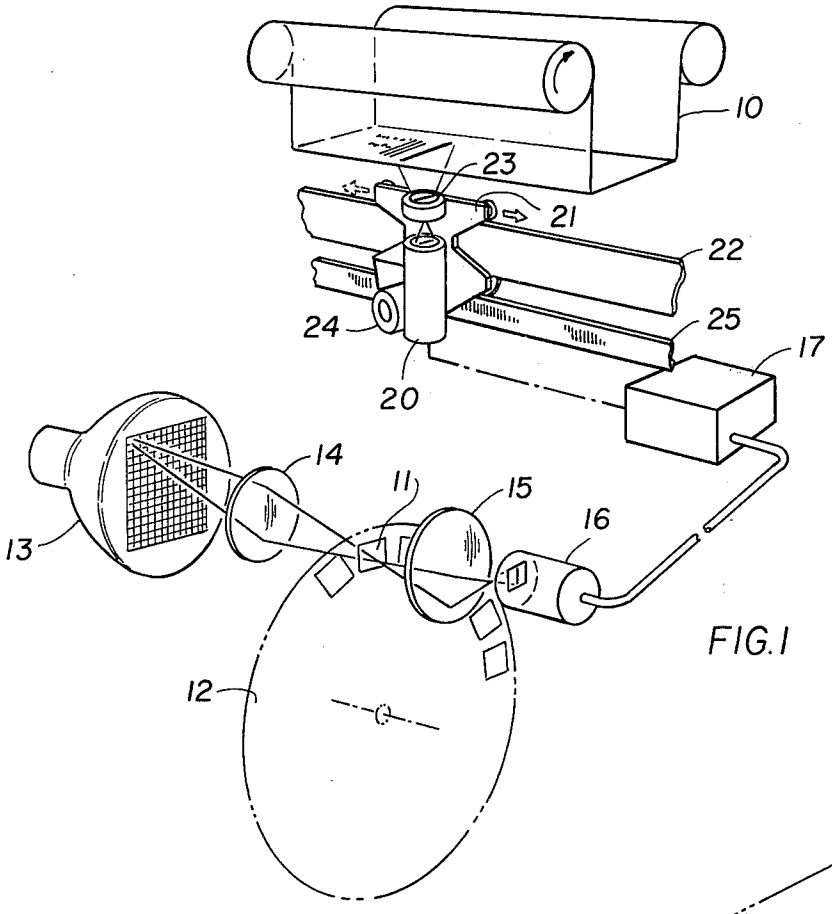

10
23
21
22
24
25
17
20
14
11
15
16
13
12

FIG. 1

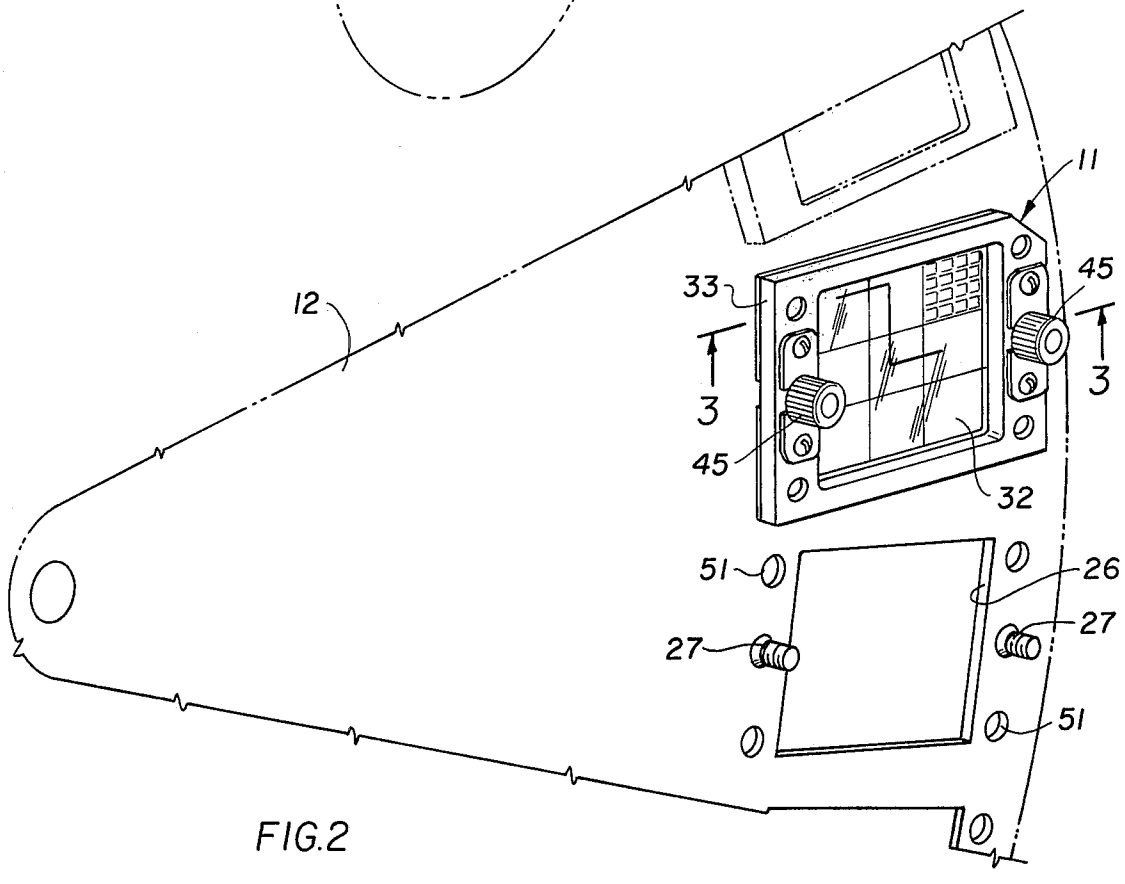

11
12
33
45
3
3
45
32
51
26
27
27
51

FIG. 2

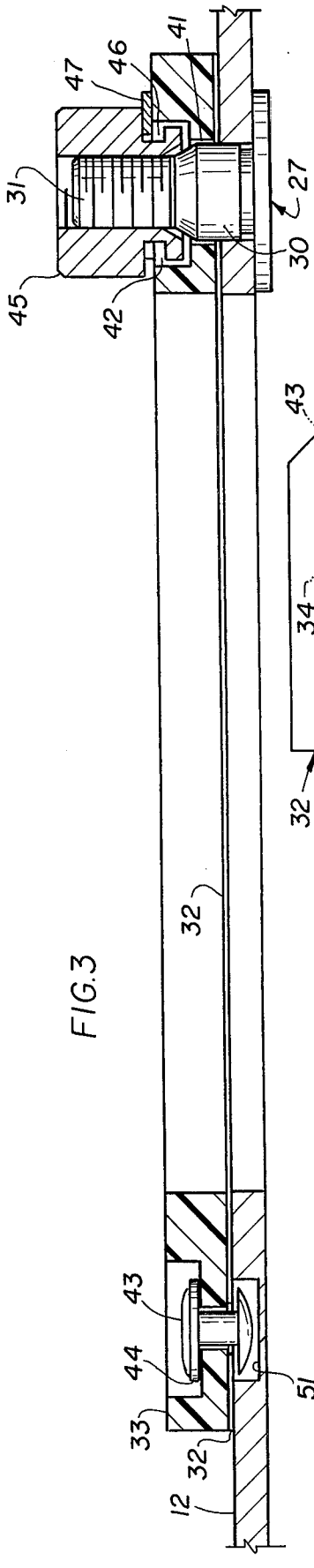


FIG.3

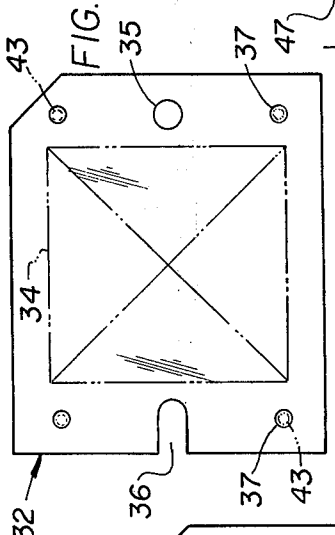


FIG.6

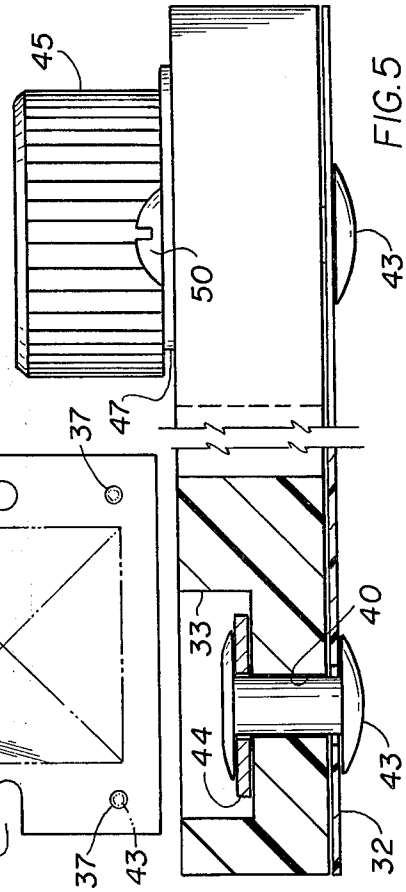


FIG.5

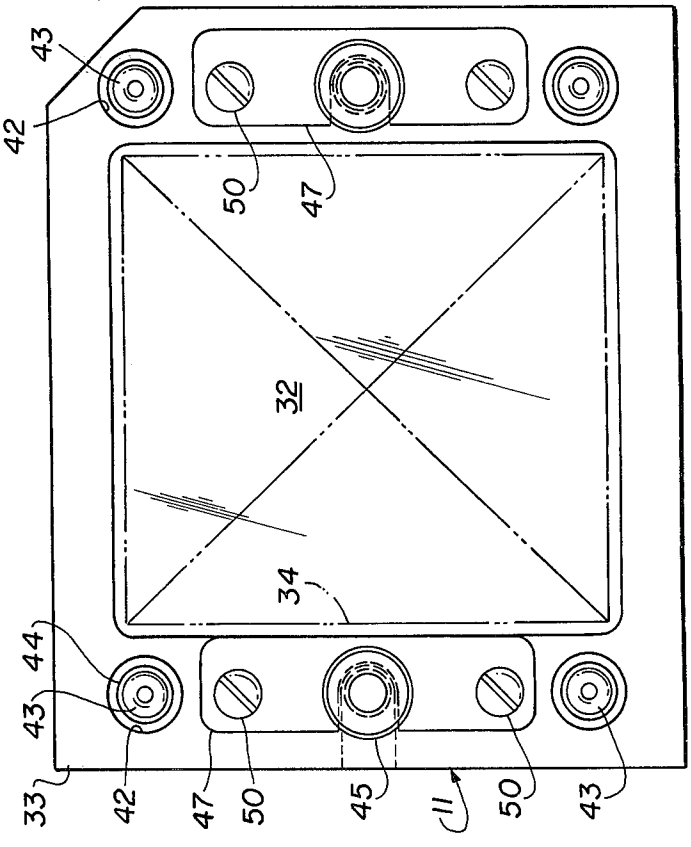


FIG.4

CHARACTER GRID FOR CRT PHOTOTYPESETTING MACHINE

This invention relates to cathode ray tube (CRT) phototypesetting machines, and especially to such machines which embody a photographic character grid that is scanned to generate the signals required for producing the characters of the phototypeset text. More particularly, the present invention pertains to the character grid which is scanned.

BACKGROUND OF THE INVENTION

In a CRT phototypsetting apparatus, the characters to be set in text on the output film or paper are initially stored, as individual characters, within the apparatus and called up as desired for setting the text composition. The character storage may be either in digital form in a core memory or the like provided in the apparatus, or in photographic form in a character grid provided in the apparatus. There are advantages and disadvantages to both forms of character storage and these must be weighed in deciding which is to be preferred in a particular machine embodiment. Generally, the use of a photographic character storage will enable a less expensive CRT apparatus to be developed. Also, it permits greater typographic refinement of the composed characters.

Heretofore, photographic character grids used in CRT phototypesetting machines comprised a glass plate having an emulsion coating in which the character images were formed photographically. The character image bearing glass plate, either before or after the character images are formed thereon, is usually mounted in a metal frame or holder which facilitates placement and securing of the character grid in the scanning position in the machine. It will be appreciated that the location of the individual characters of the grid had to be precisely determined, and the grid itself had to be accurately and stationarily mounted in the apparatus so that the electron beam which effected scanning of the character grid could be readily controlled without undue complexity in the beam positioning circuitry. Since glass plates provided the dimensional stability required for the precise location of the character images, glass plates are generally used for the photographic storage of characters in CRT phototypesetting machines.

However, glass character grids are more difficult and expensive to manufacture than the film strip character grids of the type that are used in some phototypesetting machines other than CRT phototypesetting machines. The reason that flexible film strips may be used in other type phototypesetting machines is that, in such machines, the film strip is not stationarily mounted in the machine but is moved through a photographic position so that a selected character can be photographed by flashing a light source controlled by a timing mark provided on the film strip in close proximity to the selected character. If a similar film element could be precisely located for stationary mounting in a CRT phototypesetting machine, it would be preferred due to its comparative low cost and relative ease of manufacture.

Accordingly, it is the object of the present invention to provide an improved character grid for a CRT phototypesetting machine.

It is another object of the invention to provide a relatively inexpensive character grid made of flexible material and suitable for stationary mounting in a CRT phototypesetting machine.

SUMMARY OF THE INVENTION

In carrying out the invention there is provided a flexible film element on which the character image array is photographed, and the film element is provided with alignment apertures that permit the film element to be precisely located on positioning pins provided in the CRT phototypesetting machine. The film element further is loosely secured to a rigid frame member that itself is provided with apertures which align with mounting elements provided in the CRT phototypesetting machine. The arrangement is such that the film element and the frame member are movable relative to each other so that each can be independently aligned with the positioning pins and the mounting elements, respectively. When the film element is precisely positioned on the positioning pins, the frame member is secured to the machine to clamp the film element in its aligned position.

Features and advantages of the invention may be gained from the foregoing and from the description of a preferred embodiment of the invention which follows.

In the drawing:

FIG. **1** is a schematic representation of a CRT phototypesetting machine employing the character grid of the present invention;

FIG. **2** is a fragmentary view showing a character grid of the present invention mounted on a character grid magazine;

FIG. **3** is a sectional view taken along line **3** — **3** of FIG. **2**;

FIG. **4** is a front elevational view of a character grid according to the present invention;

FIG. **5** is a side elevational view, partly in section, of the character grid shown in FIG. **4**; and

FIG. **6** is an elevational view of the font element of the character grid.

Reference is now made to FIG. **1** of the drawing wherein a CRT phototypesetting machine is schematically illustrated. The typographical characters which are phototypeset onto the sensitized film or paper **10** are stored in the apparatus on a plurality of individual character grids **11** mounted on a rotatable turret or magazine **12.** The magazine is rotatable under control of input signals to bring a selected character grid into operative position. That is, into position to be scanned by a light beam emitted from a CRT indexing tube **13.** Mechanical detenting means (not shown) may be provided to maintain the grid magazine **12** in a precisely defined location. Each character grid will contain a plurality of typographical symbols including alphanumeric characters, signs, punctuation marks, and the like. The number of symbols on a single character grid may be sufficiently large so as to include complete alphabets in two or more type faces, e.g., roman and italic, or roman and bold face, but in general, a character grid containing, for example, a roman alphabet and a bold face alphabet plus numerals and punctuation marks will be adequate for normal typesetting requirements. Different styles of type, e.g., Helvetica, Times Roman, etc., could be provided on different character grids as could symbols required for special typographical composition such as mathematical composition. The typographical symbols are generally arranged in an orthogonal array, and each symbol may be accompa-

nied by a boundary mark which is utilized to control the scanning beam in a manner not pertinent to the present disclosure.

The character grid magazine **12** is located between indexing tube **13** and objective lens **14** on one side, and condenser lens **15** and the photomultiplier **16** on the other. In the indexing tube **13** the electron beam scans only a selected portion of the face of the tube at a time, and depending on the portion scanned only a corresponding single typographical symbol will be scanned by the light emitted from the tube. For illustrative purposes, the face of tube **13** is shown with a grid pattern, each square of which corresponds to a typical scanning raster and to a symbol position on character grid **11.** By selectively scanning the indicated areas of the face of tube **13,** selected characters are simultaneously scanned. The second characters are sequentially imaged on the face of photomultiplier tube **16** which generates suitable signals corresponding to the scanned characters.

The signals from tube **16** are transmitted to the logic and control circuitry **17** which controls the printout cathode ray tube **20.** This tube is mounted on a carriage **21** which rides along rail **22** in a continuous motion to cause tube **20** and imaging lens **23** to traverse the sensitized film or paper **10.** A photo sensor **24** and light source carried by carriage **21** scans a stationary indexing grating **25** located between the light source and sensor **24** to generate feed back signals that control the raster in indexing tube **13.** For each grating line sensor **24** traverses, another raster scan line scans a portion of a character symbol on grid **11.** In this way, a single trace is impressed on the face of photomultiplier tube **16** at a time, and a corresponding single trace is illuminated on the face of tube **20** and imaged on film or paper **10** at a time. Each character image on film or paper **10** is built up by a series of adjacent abutting traces.

It will be appreciated from this brief description of a CRT phototypesetting machine that the typographical quality of the character images recorded on the film or paper **10** will be greatly enhanced by the accuracy with which character grid **11** is mounted on magazine **12.** The magazine consists essentially of a rotatable disk having a plurality of square apertures **26** located adjacent its periphery. Radially aligned on opposite sides of each aperture are a pair of grid locating pins **27.** The pins are press fitted through the disk and that portion of each pin projecting through the character grid side of the disk includes a dowel-like lower portion **30** and a threaded upper portion **31.** As will be described, the dowel-like portion **30** of each pin will have a diameter exactly equal to the diameter of an aperture and the width of a slot in the font element of character grid **11.**

Character grid **11** will now be described with particular reference to FIGS. **4, 5,** and **6.** Each character grid **11** comprises a font element **32** (FIG. **6**) and a frame member **33** to which the font element is loosely connected. The font element is an approximately square piece of flexible film having an emulsion coating on which the typographical symbols are photographically placed. The area in which the symbols are located is delineated by reference line **34.** Adjacent this area is locating aperture **35** and aligning slot **36,** both very accurately placed with reference to the symbol area defined by line **34.** Four additional apertures **37** are shown in the four corners of element **32.**

The frame member **33** is preferably of a plastic material and is the same size as font element **32.** It has a square central aperture slightly larger than the symbol area of font element **32.** When laid atop font element **32,** member **33** is provided with four corner apertures **40** that align with the corner apertures **37** of element **32.** The corner apertures **40** of member **33** are counterbored on the face of member **33** remote from font element **32.** (See FIG. **5**). The apertures in both element **32** and member **33** may be of the same diameter which as will be described is not critical. Member **33** is further provided with two apertures **41** and **42** aligned with locating aperture **35** and alignment slot **36.** The apertures **41** and **42** will be separated from each other by a distance corresponding to the distance between locating pins **27** on magazine **12.** With regard to the apertures **41** and **42,** they will be slightly larger in diameter than aperture **35** (and the width of slot **36**), and they will be counterbored as at bore **42** on the face of member **33** remote from element **32.** (See FIG. **3**). The counterbore is provided to accomodate a captive nut as will be described hereinafter. If the captive nut is omitted, the counterbore can likewise be omitted.

The font element **32** will be connected to frame member **33** by four rivets **43** which pass through the apertures **37** and **40,** respectively. The rivets will be of a diameter slightly less than that of the apertures, and when the ends of the rivets are flared this will be done so that the font element **32** is not drawn snugly against the back of member **33.** The rivets **43** and font element **32** will have a longitudinal play of approximately 0.010 inch. Thus, font element **32** will be able to be freely moved relative to member **33.** A washer **44** will preferably be provided under the flared end of each rivet.

What has so far been described would be a suitable character grid according to the present invention. The character grid would be placed on magazine **12** with locating aperture **35** over locating pin **27.** This would locate the font element **32** accurately. The other locating pin **28** would be disposed in slot **36** of the font element and thus control the alignment of the font element. With the font element thus located and aligned, frame **33** would clamp the font element **32** to magazine **12** by placing a pair of nuts on the threaded portion **31** of pins **27** and **28** and tightening the nuts down.

While the foregoing arrangement would be satisfactory, it is preferred to provide a complete character grid assembly having a pair of captive nuts **45** included therein. This preferred arrangement is shown in the drawing. Each nut **45** is provided with a circumferential groove **46** which permits a slotted retaining plate **47** secured to frame member **33** by a pair of screws **50** to keep nut **45** loosely supported in counterbore **42.** A character grid having captive nuts **45** as part of the assembly will be mounted on magazine **12** as previously described. It will be observed that magazine **12** will be counterbored, as at **51,** to accomodate the heads of rivets **43** when a grid **11** is secured thereto.

Having thus described the invention, it is clear that many changes could be made therein without departing from its spirit and scope. Accordingly, it is intended that the specification and drawing be interpreted in an illustrative rather than in a limiting sense.

What is claimed is:

1. A character grid adapted to be mounted in a scanning position in a CRT phototypesetting machine having pin-like means for defining the scanning position and wherein the typographical symbols of the grid are

selectively scanned to generate signals suitable for controlling the output of a CRT device to form images of scanned symbols on a sensitized sheet, said grid comprising a font element having an array of typographical symbols to be scanned, photographically imaged thereon and being formed of a flexible film member having locating apertures provided therein for coacting with said pin-like means of the CRT phototypesetting machine to locate said font element in the scanning position, said font element having a plurality of apertures for receiving connecting elements which join said font element to a frame member, a frame member having a plurality of apertures aligned with the connecting element receiving apertures of said font element, and a plurality of connecting elements, one for each aligned aperture in said font element and said frame member, extending through said apertures for loosely connecting said font element to said frame member, each connecting element being a rivet like member having a diameter less than that of the aperture in said font element through which it extends and a length greater than the combined thickness of said font element and said frame member, whereby a loosely connected unitary structure is formed wherein said font element can move in a direction parallel to said frame member when being accurately located in said scanning position prior to being clamped in said position by said frame member.

2. A character grid according to claim **1**, including captive nut means mounted on said frame member for clamping said frame member and said font element in the scanning position, and means for retaining said captive nut means on said frame member.

3. A character grid according to claim **1** adapted to be mounted in a CRT phototypesetting machine wherein the means for defining the scanning position include a pair of locating studs each having a lower dowel-like portion and an upper threaded portion, and wherein said character grid frame member is provided with apertures in substantial alignment with the locating apertures of said font element but of slightly greater size, said grid including captive nut means mounted on said frame member adjacent the frame member apertures, and means for retaining said captive nut means on said frame member, the arrangement being such that said font element is positioned by the dowel-like portion of the locating studs and the captive nut means cooperate with the threaded portion of the locating studs to clamp said frame member and said font element in the scanning position.

* * * * *

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,916,422 Dated October 28, 1975

Inventor(s) Karl R. Heidenreich

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 3, line 17, after the "The", "second" should read ----scanned----.

Signed and Sealed this

twentieth Day of January 1976

[SEAL]

Attest:

RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents and Trademarks

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,916,422 Dated October 28, 1975

Inventor(s) Karl R. Heidenreich

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 3, line 17, after the "The", "second" should read ----scanned----.

Signed and Sealed this

twentieth Day of January 1976

[SEAL]

Attest:

RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents and Trademarks