Sept. 19, 1961 R. C. O'BRIEN 3,000,279

PHOTOGRAPHIC TYPE COMPOSITION

Filed July 24, 1957 2 Sheets-Sheet 1

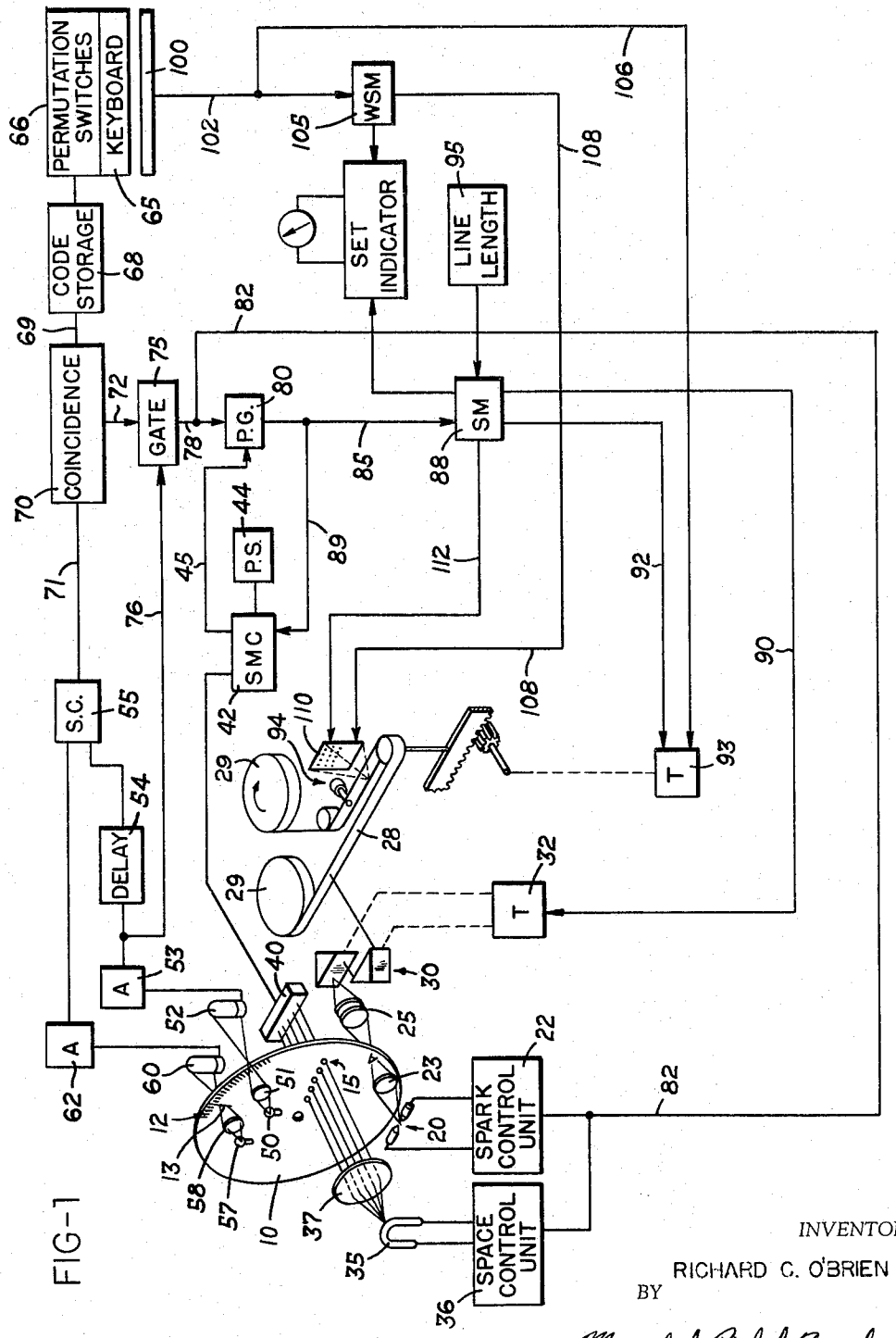


FIG-1

INVENTOR.
RICHARD C. O'BRIEN
BY
Marechal, Biebel, French & Bugg
ATTORNEYS

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Filed July 24, 1957 2 Sheets-Sheet 2

FIG-2

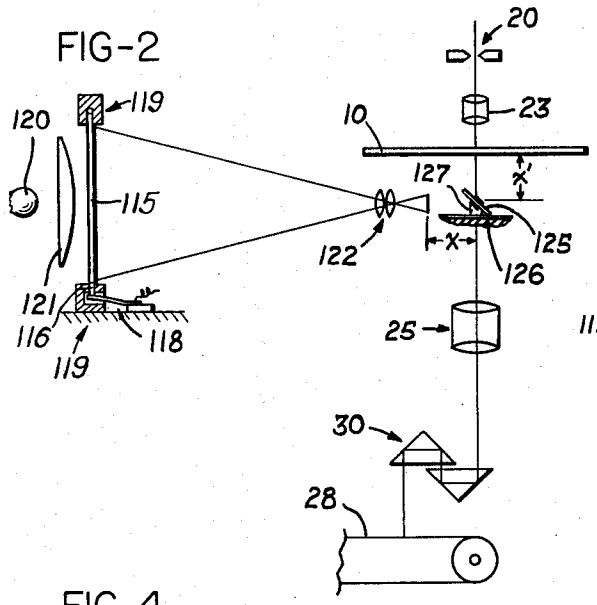


FIG-3

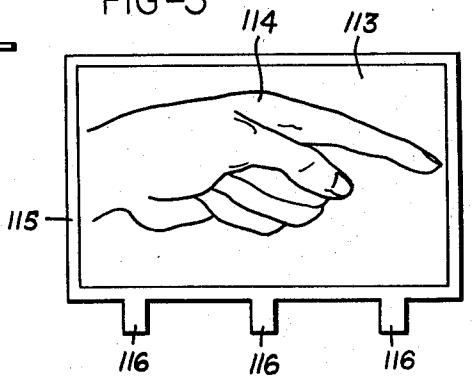


FIG-4

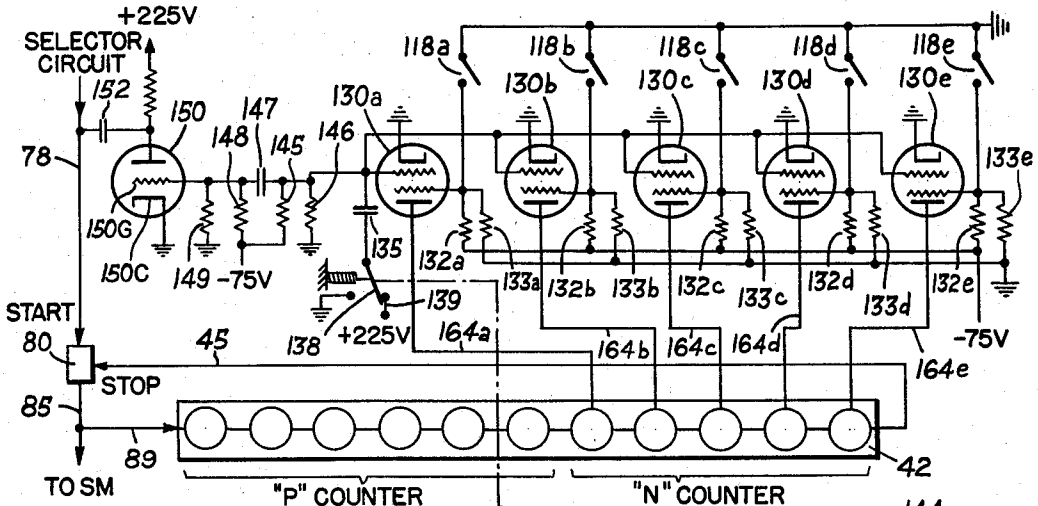
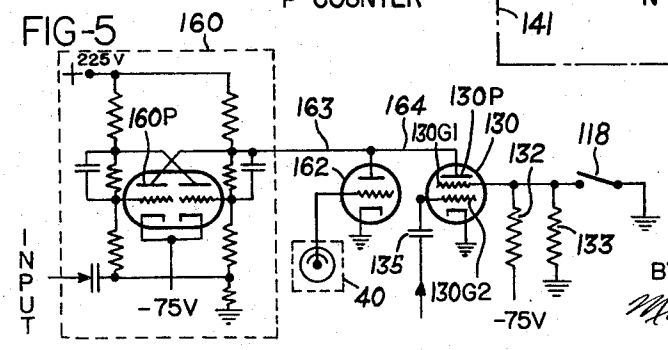
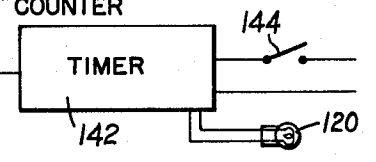


FIG-5





INVENTOR

RICHARD C. O'BRIEN

BY

Marschal, Bibel, Brucks & Bugg

ATTORNEYS

United States Patent Office 3,000,279 Patented Sept. 19, 1961

3,000,279

PHOTOGRAPHIC TYPE COMPOSITION

Richard C. O'Brien, Cleveland, Ohio, assignor to Harris-Intertype Corporation, Cleveland, Ohio, a corporation of Delaware

Filed July 24, 1957, Ser. No. 673,934
11 Claims. (Cl. 95—4.5)

This application relates to phototypecomposing, and particularly to apparatus providing for the use of unusual or pi characters in the process of composing a line.

The present invention is especially useful in connection with phototypesetting machines which employ a matrix disk carrying the characters as portions of differential light transmitting ability such that passage of a light beam through the disk will result in an image-bearing light beam. The matrix disk carries all the usual characters, but it is a difficult and time consuming operation to add characters to the disk in properly aligned relation, and often there is no available space on the disk for such added characters.

More important, the unusual or pi characters (as they are referred to by printers) are needed only in the exceptional job, or at infrequent times, and thus it is really uneconomical from both a time and space consuming standpoint to place them on a matrix disk.

Accordingly, the primary object of this invention is to provide for the use of pi characters in phototypesetting equipment.

Another object of the invention is to provide for introduction of a light beam bearing a character image into the main optical system of a phototypesetting apparatus and thus to provide a special character in proper point set without need of additional optical equipment for that purpose.

A further object of the invention is to provide for introduction of space code information related to the pi character into the space computing mechanism of the phototypesetting apparatus for proper spacing of the pi character in the composing operation.

An additional object of the invention is to provide for use of relatively large plate-like members having transparent and opaque portions defining a desired character, with these members bearing space code indicia for indicating the spacing requirements of that particular character, and thereby to simplify the construction of a character defining member.

Other objects and advantages of the invention will be apparent from the following description, the accompanying drawings and the appended claims.

In the drawings—

FIG. 1 is a schematic diagram illustrating phototypecomposing apparatus in accordance with the invention;

FIG. 2 is a schematic diagram illustrating the manner in which light beams carrying special characters are introduced into the optical system of the apparatus shown in FIG. 1;

FIG. 3 is an enlarged plan view of a pi character plate and its associated frame;

FIG. 4 is a diagram showing the manner in which the space code information obtained from the frame of FIG. 3 is introduced into the apparatus of FIG. 1, and also showing how recording of the special character from the plate is initiated;

FIG. 5 is a diagram illustrating the connection between the space code receiving apparatus of FIG. 4 and the respective stages of the counter shown schematically in FIG. 4.

Referring to the drawings, which illustrate a preferred embodiment of the present invention, FIG. 1 is a schematic representation of a high speed phototypesetting apparatus including a rotating matrix disk **10** carrying the characters to be reproduced as, for example transparent portions in a significant zone of predetermined radial depth on the disk. The character zone is represented in FIG. 1 by the character A. In other zones of the disk there are a series of timing marks **12**, one for each character on the disk, and in a further zone there is a single reference mark **13** the purpose of which is to supply an initiating pulse. In another zone a binary space code related to, and identifying the relative width of, each character is supplied in the form of a series of transparent dots **15** on the disk, shown for purposes of illustration as representing a five digit binary code. It will be apparent, of course, that the marks, dots, and characters on the disk may be either transparent or opaque, so long as they contrast with the background area of the disk.

The overall arrangement of the apparatus is generally similar to that disclosed in copending applications Serial No. 380,802, filed September 17, 1953, now patent No. 2,846,932 and Serial No. 640,741, filed February 18, 1957, now patent No. 2,944,472, assigned to the same assignee as this application.

In general, the arrangement of the apparatus is as follows. A flashing light source of high intensity and short duration is provided, such as by the spark gap **20** controlled by the spark control unit **22**, and this light source is arranged to illuminate the character zone of the disk through a lens **23**, with the resulting image-bearing light beam being focused through a lens system **25** upon a record film strip **28** which is supported across the light beam between film drums **29**. The character-image-bearing light beam passing to film strip **28** is intercepted by a space prism system **30** controlled by a suitable transducer **32** for displacing the light beam with respect to the film strip without altering the focus thereof. Such a prism system is described in detail in copending application Serial No. 661,633, filed May 27, 1957.

A further flashing light source **35** connected to a space control unit **36**, is arranged to illuminate the space code dots **15** through a lens **37**, and the resulting one or more small light beams passing through the disk fall upon a bank of photocells **40** which provide a space code pickup. The information from the space code pickup is supplied to a space memory computer **42**, this information being used to preset the later stages of the binary counter (the "N" counter in FIG. 4) as disclosed in detail in said copending application Serial No. 380,802. The remaining or first stages of the space memory computer (the "P" counter in FIG. 4) are preset by a suitable point set control **44**, so that the output through line **45** represents the product of the point set and the required space for the illuminated character as transmitted from the space code pickup **40**.

A lamp **50** and lens **51** direct a light beam through the zone of timing marks **12**, the resulting pulsating light beam falling upon the photocell **52**. The pulsating output of this photocell is directed through an amplifier **53** and through a delay circuit **54** into a selector counter **55**, as described in detail in said copending application Serial No. 640,741. A further lamp **57** and lens **58** direct a light beam toward the zone of the index mark **13**, and the resulting light beam falls upon the photocell **60** once during each rotation of the disk **10**, thereby providing an index from which the location of any selected character on the disk may be determined by counting the number of timing pulses occurring after the index pulse. The output of photocell **60** is connected through amplifier **62** to selector counter **55**, and is arranged to reset the counter to a zero count to provide the desired index or reference point. The count in the selector counter **55** is, then, indicative of the position of each character on disk **10** with reference to the index mark **13**.

A suitable keyboard, such for example as the keyboard

65 of a typewriter, is arranged to actuate a bank of permutation switches or the like indicated schematically at 66, and these switches are arranged to provide binary code information identifying the selected character to a temporary code storage 68 comprising a bank of binary stages equal in number to the stages of selector counter 55. The information in code storage 68 is supplied through its output 69 to a coincidence circuit 70, and the output 71 of selector counter 55 is likewise received in the coincidence circuit. Thus, when the code information in code storage 68 corresponds to the count of selector counter 55, an output signal will be transmitted through the coincidence output 72 to a suitable gate circuit 75, as more fully explained in said copending application Serial No. 640,741.

Gate circuit 75 also receives undelayed timing pulses directly from amplifier 53 through line 76, and thus when an output signal passes through coincidence output 72 the output line 78 of the gate circuit will transmit a trigger pulse on the next received timing pulse from line 76. The trigger pulse is supplied to a pulse generator 80 for the purpose of starting the same, and the trigger pulse also is transmitted through line 82 to the spark control unit 22 and space control unit 36 for flashing the light source 20 and 35, respectively. This causes the light source 20 to illuminate the selected character and the resultant character image is recorded on the film strip 28.

At the same time, space code information is supplied to the pickup apparatus 40 and is used to set up the space memory computer 42, the point set control having been set manually to select the desired size of type. The pulse generator 80 has its output 85 connected to a space memory counter 88, and line 85 is also connected through a line 89 to the space memory computer 42. The output line 45 of the space memory computer is in turn connected back to pulse generator 80 to supply a stop pulse thereto, and thus after the space memory computer has counted a number of output pulses from generator 80 equal to the product of the point set and the space requirement of the selected character image, the pulse generator 80 is stopped. As a result of this the number of pulses transmitted to space memory counter 88 is a digital representation of the space required for the selected character at the desired point setting.

Space memory counter 88 is a multistage binary counter, one embodiment of the invention having used a thirteen stage counter for this purpose. The first seven stages of this counter are connected to the prism spacing transducer 32 through the output connection 90, and the eighth stage of counter 88 is connected through an output line 92 to a film advance transducer 93 which controls rotation of one of the film reels 29 to advance the film strip 28 with respect to the image bearing light beam through predetermined large space increments.

As more fully explained in said copending application Serial No. 661,633, filed May 27, 1957, the arrangement of the parts is such that one pulse fed into space memory counter 88 is equal to one $\frac{1}{128}$ of a pica, and this small discrete space measurement is referred to hereinafter as a space unit or a piclet. Therefore, the first seven stages of space memory counter 88 handle spacing requirements from $\frac{1}{128}$ to $\frac{127}{128}$ of a pica and transmit this spacing information through output 90 to the prism controlling transducer 32. Movement of the spacing prism system 30 thus controls all spacing requirements up to one space unit less than a full pica. The output line 92 transmits a pulse to the film advance transducer 93 only when the spacing requirements equal or exceed a full pica, and the arrangement of this transducer is such (as explained in copending application Serial No. 661,633, filed May 27, 1957) that for every pulse received through line 92 the film strip is advanced through a distance of one pica and the prism system is readjusted accordingly. The advance portion of the film strip is held stationary during the composing of a single line by the index punch, indicated generally at 94, and when the spacing movement of strip 28 is complete for one line this punch is released and the film advanced into the take-up reel, as more fully explained in said copending application.

The capacity of space memory counter 88 is preset by a suitable line length control 95 so that when the counter 88 fills up, an end-of-line sequence (including release of punch 94) can be initiated in any well known manner. In practice a thirteen stage binary counter has been sufficient for this purpose, giving a maximum possible line length of 64 picas, or more than ten and one-half inches. The exact length of the line is determined by manipulating the line length control to preset the last stages of counter 88. Then, after the composer finishes typing a line, the difference between the preset capacity of this counter and the total space counted will be the space which must be divided between the word spaces in the line to justify.

Spaces between words are inserted in uniform length in this apparatus, and these spaces later are adjusted in suitable justifying apparatus operating from code information carried on the film strip 28, as more fully explained in said copending application Serial No. 380,802. Thus, whenever the word space bar 100 on the keyboard is actuated a pulse is fed through line 102 to a word space memory counter 105, and such pulse also is passed through line 106 to the film advance transducer 93, causing the film strip to be advanced through a suitable word spacing movement. Counter 105 is a further binary counter, for example a five stage counter. Its output 108 extends to a suitable code lamp panel 110 arranged adjacent the film strip 28, and a further output 112 from space memory counter 88 also extends to panel 110. The purpose of this arrangement is to provide a scoreboard which indicates, in suitable binary code, the unused space remaining in the line, and the number of word spaces in the line (from counter 105). At the end of each line the code on panel 110 is projected onto the film strip to provide a permanent record of this information thereon as a series of code dots.

The general overall arrangement of the phototypesetting device, therefore, provides for flashing light beams bearing character images in selected sequence along the main optical axis of the device, as defined by the lens system 25 and space prism system 30. At the same time, the code information related to the spacing requirements for each character image, as it is selected, is passed through the space code pickup 40 to the space memory computer 42, and from there to the space memory counter 88 which in turn provides actuating signals for the spacing transducers 32 and 93, respectively. Operation of these transducers results in relative movement between the main optical axis and the film strip 28 to provide the necessary spacing for each character recorded on the strip.

In composing operations it often is necessary to use an unusual character, such for example as a key sign or some other character which is out of the ordinary. For purposes of example in this application the unusual character, referred to by printers as a pi character, is shown as a hand with pointing index finger. Such a character is shown in FIG. 3 and will be further described in connection with the device illustrated therein.

The matrix disk 10 in phototypesetting apparatus of the type under consideration here carries the usual character images such as numerals, upper and lower case letters, and other common characters such as periods, commas, colons, % sign, and the like. However, it would be difficult to remove the matrix disk and construct a pi character thereon even if there were spaces on the disk provided for such purpose. In accordance with the present invention, however, such pi characters may be inserted separately from the matrix disk and may be constructed on a large and therefore relatively easy to use scale,

Thus, referring to FIG. 3, a pi character plate **113** is shown bearing the pi character image **114**, and the plate **113** is carried within a frame **115** having a number of finger-like projections **116** extending from one edge thereof. The pi character is defined by transparent and opaque portions of plate **113** which may be illuminated to provide a light beam bearing the pi character image.

Along the side of plate **115**, a number of projecting fingers **116** are arranged in predetermined spaced relationship. These fingers are used to represent the spacing requirements of the pi character in a binary code which for purposes of illustration is shown as a five digit binary code, similar to the space code dots **15**. Thus in the form shown there are fingers in the first, third, and fifth positions representing the binary code number 10101. Obviously a different pattern of fingers will provide a different code number.

Referring to FIG. 2, the plate **115** is supported by suitable means shown diagrammatically at **119** in front of a light source **120** which serves to illuminate the pi character plate through a suitable lens **121**. The fingers **116** rest upon switches **118***a–e*, there being one switch for each finger position on a pi character plate. The character image bearing light beam passes from frame **115** through a lens system **122**, and from this lens the light beam passes to a reflecting surface **125** provided by a prism or mirror or another suitable light reflecting device which will pass the pi character image-bearing light beam into the main optical system of the apparatus, and thus through the main lens system **25**. The image plane of lens system **122** is located at the same distance x from the main optical axis as the distance of the reflecting mechanism **125** from the matrix disk **10**, the latter distance being designated x' on the drawing. In this manner the image of the pi character is properly in focus when it passes into the main optical system of the apparatus and from thence onto the film strip **28**. Any suitable mechanism, such as track **126** and mounting **127**, may be used to move the reflecting member **125** into and out of alignment with the main optical axis of the apparatus, if it is necessary that this surface be removed during normal operations when light beams are passing through matrix disk **10**. Another possible construction is to provide a half-silvered mirror as the reflecting member **125**, and thus light beams passed from disk **10** through such a mirror would not be appreciably reflected or deflected, while the beams from the pi character plate would be reflected along the main optical axis.

Referring to FIG. 4, the individual space code switches **118***a–e* are grounded at one side, and closing of one or more of these switches is arranged to provide a binary code signal as follows. A bank of pentodes **130***a–e*, for example type 6AS6, are arranged with their plates **130**P connected into the last five stages of the space memory computer **42**, a typical one of such connections being shown in FIG. 5. The cathodes of each of the control tubes are grounded, and the first control grids **130**G1 are normally maintained at a negative potential through a voltage dividing network including resistors **132** connected to a potential below ground, for example of the order of −75 volts, and resistors **133** connected directly to ground. The switches **118** are arranged to bypass this negative bias and thus to bring the first control grids up to a potential of approximately the same order as the cathodes, and in this particular type of tube such a change in control grid potential is sufficient to provide for conductance provided that the second control grids are not cutting off the tubes.

The second control grids **130**G2 are all connected through a condenser **135** to an initiate switch **138** which is of the single-pole double-throw type. In one position, as shown, this switch connects directly to ground and the potential of the second grid is thus low enough, in combination with a grid **130**G1 at negative potential, to cut off the tubes. In its other position switch **138** is arranged to supply a positive pulse from a source of positive potential **139** to the grids **130**G2 through condenser **135**, thereby providing for conductance of whichever of the tubes **130***a–e* is not cut off by its first control grid. Switch **138** is controlled, as indicated schematically at **141**, by a timer **142** the operation of which is initiated by the pi button switch **144**. This switch may be located upon the keyboard **65** if desired.

Thus, when the pi button is pushed, assuming that a pi character plate is in place, the pi character is photographed, and after the timer operates the last five stages of space memory computer **42** will be set up by the pi space control tubes **130***a–e*. This sequence occurs as switch **138** is moved to its grounded contact and a negative pulse is fed through condenser **135** into a voltage dividing network including resistor **145** which is connected to a source of negative potential, and resistor **146** which is grounded. This negative pulse is ignored by the already negatively biased network. After the pi character is photographed, timer **142** returns switch **138** to the illustrated position and a positive pulse is passed through condenser **135**. This brings the second grids of tubes **130***a–e* to a positive potential and those tubes will conduct which have their first grids grounded through closed switches **118***a–e*.

In addition, a positive pulse will pass through condenser **147** to a further voltage dividing network including resistors **148** and **149**. An initiate control triode **150**, having its cathode **150**C connected to ground, has its control grid **150**G arranged to be held normally at a potential below ground, but when a pulse from condenser **147** causes initiate tube **150** to conduct, a starting pulse is passed from output condenser **152** into the line **78** connecting the coincidence circuit **70** to pulse generator **80**. Thus the pulse generator is started and continues to supply pulses to space memory counter **42** until an output pulse therefrom through line **45** stops the pulse generator. The first six stages of this counter are arranged to be preset by the point set control **44**, as more fully described in copending application Serial No. 380,802.

The manner in which the pi code bank of tubes **130** is connected into computer **42** is illustrated in FIG. 5, wherein one of the last five binary stages of computer **42** is shown generally at **160**, and the input connection thereto from an associated photocell in the code pickup bank **40** is shown as coming through an input triode **162** and input line **163** which leads to the plate **160**P at one side of the dual triode within the stage **160**. As is well known in the art, when a signal passes through line **163** the balance of the flip-flop circuit is upset and the stage is preset, as by causing that side of the circuit including plate **160**P to conduct. In the same manner, an associated pi character control tube **130** has its plate connected to line **163** through a line **164**, and the input to the counter stages from tube **130***a–e* through lines **164***a–e* (FIG. 4) will be apparent upon consideration of the drawing and in view of the above explanation of the operation of the pi character code bank.

The timer **142** is connected to control light source **120**, and thus when the pi button is depressed the light source is actuated and a light beam carrying the pi character image is introduced into the main optical system of the apparatus, as previously described. Immediately thereafter the computer **42** is set up in accordance with the information relating to the spacing necessary for the pi character, and this information together with the point set information determines the number of pulses transmitted through line **85** to the space memory **88**. The space memory in turn actuates the transducers **32** and **93** to provide for the required relative movement between the main optical system of the apparatus and the film strip **28**. The spacing necessary for the pi character is thus introduced into the apparatus at the proper time.

It should be noted that the pi character plate is of relatively large size. For example, a practical embodiment of this invention may employ a slide of approximately

4 x 6 inches. In this way it is a relatively simple matter to draw the desired pi character upon the plate and the substantial reduction in the pi character optical system, including lens **122**, will provide a well defined image which is then transmitted to the record strip **28**. At the same time, it is also a simple matter to insert the proper space code information into the machine merely by providing the proper number of fingers **116** in the proper places, all in accordance with the binary space code system used. These fingers can be provided as detachable elements if the same frame **115** is used for a number of pi character plates, or if it is expedient to store the pi character plates in their own individual frames, then the fingers **116** can be provided as integral or permanent attachments to the appropriate edge of frame **115**.

While the form of apparatus herein described constitutes a preferred embodiment of the invention, it is to be understood that the invention is not limited to this precise form of apparatus, and that changes may be made therein without departing from the scope of the invention which is defined in the appended claims.

What is claimed is:

1. Apparatus for use in a phototypesetting device having a type matrix and a primary optical system through which image bearing light beams are passed from the matrix for recording on photosensitive record material, said device also including means for producing relative movement between the optical system and the record material in accordance with the spacing requirements of the projected character images, comprising a pi character plate having transparent and opaque portions defining a pi character and also having code indicia related to the spacing requirements of the pi character, means for illuminating said plate to provide a light beam bearing a pi character image, means for directing said pi character image into said primary optical system for recording on said record material, means for sensing the code indicia on said plate, and means connecting said sensing means into said spacing movement producing means for inserting the spacing information related to the pi character into said device and providing proper spacing therefor in conjunction with the recording operation.

2. In combination with a phototypesetting device having a type matrix and a primary optical system through which image bearing light beams are passed from said matrix for recording on photosensitive record material, said device also including means for producing relative movement between said optical system and the record material, said movement producing means including a computer for calculating the required spacing for each character from spacing information received from said matrix and transducer means operatively arranged to receive information from said computer and to move said record material accordingly through the necessary spacing movement, a pi character plate having transparent and opaque portions defining a pi character and also having space code indicia related to the spacing requirements of the pi character, means for illuminating said plate to provide a light beam bearing a pi character image, means for directing said pi character image into said primary optical system for recording on said record material, means for sensing said space code indicia on said plate, and means connecting said sensing means to said computer for supplying spacing information to said computer related to the spacing requirements of the pi character.

3. In combination with phototypesetting apparatus having a type matrix carrying a plurality of characters of related size and a primary optical system through which image bearing light beams are passed from the matrix for recording in selected sequence, photosensitive material mounted to record images transmitted thereto, said pirmary optical system including means for controlling the size of the recorded image, means for producing relative movement between said optical system and the record material in accordance with the spacing requirements of each projected character image, a pi character plate having transparent and opaque portions defining a pi character of predetermined size relation relative to said characters on said matrix, means for illuminating said plate to provide a light beam bearing a pi character image, means for directing said pi character image bearing light beam into said primary optical system and through said size controlling means to record the pi character on said record material in proper size relation to the other character images being recorded during a typesetting operation, and means for supplying spacing information related to the required width of said pi character to said movement producing means for causing requisite spacing movement for said pi character.

4. In combination with phototypesetting apparatus having a type matrix and a primary optical system through which image bearing light beams are passed from the matrix for recording on photosensitive record material, said primary optical system including means for controlling the size of the recorded images, means for producing relative spacing movement between said primary optical system and said record material in accordance with spacing requirements of each projected character image, said movement producing means including apparatus for transmitting code data representing the relative spacing requirements of each character image on said matrix, means for registering code data representing the point setting of said size controlling means, computing means having inputs connected to said data transmitting means and to said data registering means for calculating the required spacing of each character image from such data, connections from said computing means to supply controlling information to said spacing movement producing means, a pi character plate having transparent and opaque portions defining a pi character, means for illuminating said plate to provide a light beam bearing a pi character image, means for directing said pi character image bearing beam into said primary optical system and through said size controlling means to record the pi character on said record material in proper size relation to the other character images being recorded during a typesetting operation, and means for supplying said computing means with code data representing the relative spacing requirements of said pi-character image for computation of spacing control information corresponding to the required size of said pi character.

5. In phototypesetting apparatus of the character described the combination of a selectively operable light source, means for defining a light beam issuing from said source, a character plate having transparent and opaque portions defining a character to be reproduced, means for supporting photosensitive record material in position to intercept said light beam, means for mounting said plate in position intercepting said light beam to provide a character image bearing light beam directed on the record material, means for producing relative movement between said record material supporting means and the image bearing light beam to provide for spacing of successively projected character images on said record material, means providing space code data on a marginal portion of said plate for identifying the necessary relative width of the character image projected onto the record material, pickup means for reading said code data from said plate, and computing means receiving space code information from said pickup means for calculating the width necessary for proper spacing of the character image, said computing means having an output to said movement producing means for causing spacing movement related to the projected character image.

6. In phototypesetting apparatus of the character described the combination of a plate having portions of differential light transmitting ability defining a character to be reproduced, selectively operable means for illuminating said plate to produce an image bearing light beam,

photosensitive record material for recording the character image, means for directing said beam onto said record material, means including a transducer and a computer controlling operation of said transducer for producing relative movement between said light beam and said record material to space successively projected character images on said record material, means on said plate defining digital space code information identifying the width of the character defined on said plate relative to the widths of other characters in a selected type style, pickup means for reading said space code information, said pickup means having an output connection to said computer, gate means in said output connection for controling the supply of space information to said computer, and means connected to said illuminating means and to said gate means for coordinating the opening of said gate means with operation of said illuminating means.

7. Phototypesetting apparatus including a type matrix and a primary optical system through which image bearing light beams are passed from the matrix for recording on photosensitive record material, said primary optical system including means for controlling the size of the recorded images, means including a transducer and a computer controlling operation of said transducer for producing relative movement between said primary optical system and said record material in accordance with spacing requirements of each projected character image, a plate having portions of differential light transmitting ability defining a character to be reproduced, selectively operable means for illuminating said plate to produce an image bearing light beam, means for introducing the resultant character image from said plate into said primary optical system and through said size controlling means, means on said plate defining digital space code information identifying the width of the character defined on said plate relative to the widths of the characters on said matrix, pickup means for reading said space code information, said pickup means having an output connection to said computer, gate means in said output connection for controlling the supply of space information to said computer, and means connected to said illuminating means and to said gate means for coordinating the opening of said gate means with operation of said illuminating means.

8. Apparatus for use in a phototypesetting device having a type matrix and an optical system through which image bearing light beams are passed from the matrix for recording on photosensitive record material, said device also including means for producing relative movement between the optical system and the record material in accordance with the spacing requirements of the projected character images, comprising a pi character plate having transparent and opaque portions defining a pi character and also having portions bearing indicia related to the spacing requirements of the pi character, means for illuminating said plate to provide a light beam bearing a pi character image, means for directing said pi character image into said optical system for recording on said record material, means for transmitting to said device spacing information corresponding to said indicia, and means connected to said spacing movement producing means and responsive to receipt of said spacing information for inserting the spacing information related to the pi character into said device and providing proper spacing therefor in conjunction with the recording operation.

9. In phototypesetting apparatus of the character described the combination of a selectively operable light source, means forming a light beam issuing from said source, a character plate having transparent and opaque portions defining a character to be reproduced, means for supporting photosensitive record material in position to intercept said light beam, means for mounting said plate in a stationary position with respect to said light source intercepting said light beam to transmit a character image on said light beam directed to the record material, means for producing relative movement between said record material supporting means and the image bearing light beam to provide for spacing of successively projected character images on said record material, means providing space code data on a marginal portion of said plate for identifying the desired relative width of the character image projected onto the record material, pickup means for reading said code data from said plate, computing means connected to said pickup means to receive space code information therefrom for calculating the width for proper spacing of the character image, and an output from said computing means connected to said movement producing means for causing appropriate spacing movement for the projected character image.

10. In combination with a phototypesetting device having a type matrix, a primary light source, and a primary optical system through which image bearing light beams are passed from said matrix for recording on photosensitive record material, said device also including means for producing relative movement between said optical system and the record material, said movement producing means including a computer for calculating the required spacing for each character from spacing information received from said matrix and transducer means operatively arranged to receive information from said computer and to move said record material accordingly through the necessary spacing movement, a pi character plate having transparent and opaque portions defining a pi character and also having space code indicia related to the spacing requirements of the pi character, a secondary light source for illuminating said plate to provide a light beam bearing a pi character image, means for directing said pi character image into said primary optical system for recording on said record material, means for sensing said space code indicia on said plate, and means connecting said sensing means to said computer for supplying spacing information to said computer related to the spacing requirements of the pi character.

11. Phototypesetting apparatus including a type matrix, a primary light source, and a primary optical system through which image bearing light beams are passed from the matrix for recording on photosensitive record material, said primary optical system including means for controlling the size of the recorded images, means including a transducer and a computer controlling operation of said transducer for producing relative movement between said primary optical system and said record material in accordance with spacing requirements of each projected character image, a plate having portions of differential light transmitting ability defining a character to be reproduced, a selectively operable secondary light source for illuminating said plate to produce an image bearing light beam, means for introducing the resultant character image from said plate into said primary optical system and through said size controlling means, means on said plate defining digital space code information identifying the width of the character defined on said plate relative to the widths of the characters on said matrix, pickup means for reading said space code information, said pickup means having an output connection to said computer, gate means in said output connection for controlling the supply of space information to said computer, and means connected to said illuminating means and to said gate means for coordinating the opening of said gate means with operation of said illuminating means.

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