Nov. 30, 1965 L. STARCK 3,220,641

COMPOSING METHOD

Filed Oct. 17, 1962 2 Sheets-Sheet 1

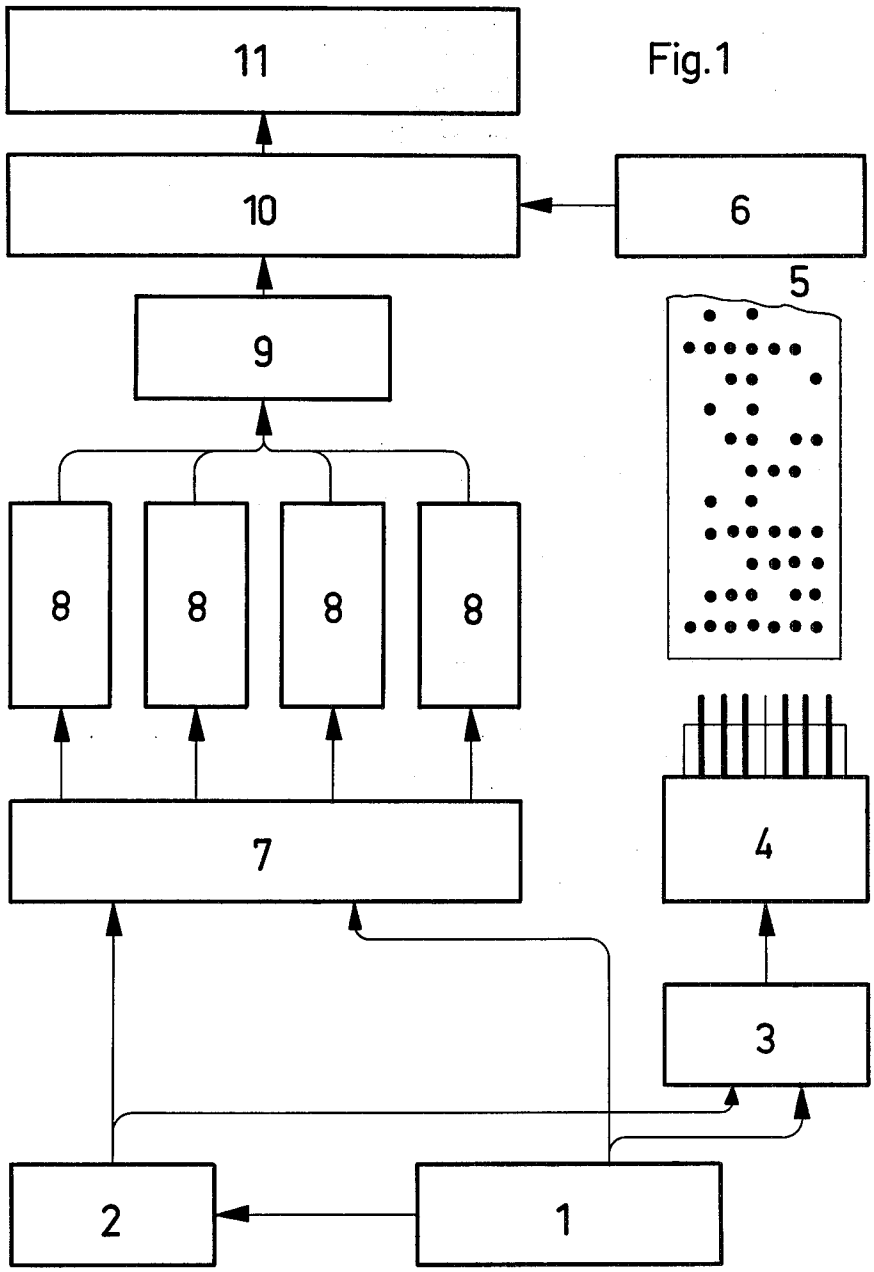


Fig.1

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Fig. 2

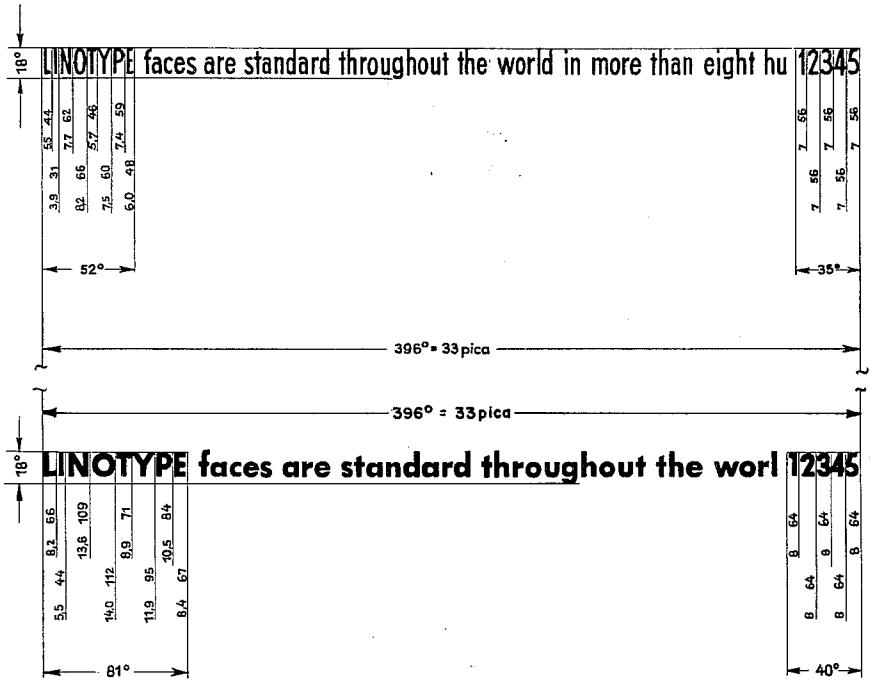


Fig. 3

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COMPOSING METHOD

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16 Claims. (Cl. 234—1)

The present invention relates to a composing method for line casting apparatus, and more particularly to a method of representing each matrix by an integer number so that the total of the respective numbers of the matrices used for composing a line, accurately represents the actual length of the line before justification.

In automatic line casting apparatus, such as Linotype machines, perforators are used for marking a control tape with coded perforations representing numbers associated with matrices, and the numbers of matrices selected by operation of the keyboard which controls the perforator are totalized and indicated so that the operator can determine the length of the composed line, and knows when such composed length is sufficient for justification.

In one known arrangement, counting means are used for counting a counting unit, which is a fraction of the em quad of the respective font of matrices which is to be used. The characteristic numbers are stored in the perforated tape. In accordance with the thickness of the respective matrix of the character or symbol, a greater or smaller number of coded perforation combinations are perforated within the given length corresponding to a composed line.

It is a disadvantage of this counting method, in which the counting unit is a given fraction of the em quad point number, that a different unit must be used for each font of matrices having different em quad point numbers. This results in the necessity of adjusting the indicator by which the total number of units corresponding to a justifiable line is indicated, whenever a different font of matrices is used.

It has also been proposed to use an absolute unit being a fraction of a counting basis, for example a binary fraction of the twelve point em quad.

However, all known methods of counting units representing the width or thickness of matrices, cause inaccuracies since the numbers of counting units representing the selected matrices are usually rounded off values even for em quads and half em quads. These inaccuracies prevent in many cases the composing of a typographically exact line which would correspond to the high standard of a line composed by a manual operation. This disadvantage is particularly present if the otherwise advantageous counting method using absolute units is employed, and particularly noticeable when tables consisting of spaced columns are set.

It is one object of the present invention to overcome these disadvantages of prior art composing methods, and to provide a composing method resulting in accurately composed lines.

Another object of the invention is to provide a composing method in which different fonts of matrices or types can be used with the same counter means and indicator without adjustment.

Another object of the invention is to provide a perforating system with registers and a totalizer operated by

numbers expressed in an absolute unit. The composing method according to the invention uses an absolute unit for the counter means, the absolute unit is selected in such a manner that at least each quadding matrix is accurately represented by an integer number in the counter or totalizer irrespective which matrix of a plurality of different fonts is selected.

The absolute unit is the same for all em quad point numbers and is so selected that the thickness of the em quad matrix body and half em quad matrix body can be expressed as an integer multiple of the selected unit.

The unit is preferably so selected that the typographical basis of the system is an integer multiple of the selected unit.

The composing method of the present invention is used in line casting apparatus, such as a Linotype machine, and comprises selecting matrices from one selected font of matrices of a plurality of fonts of matrices; producing a counting signal for each selected matrix representing the thickness of each matrix by a number expressed in absolute units selected in such a manner that each counting signal represents an integer multiple of the absolute unit irrespective which font is selected; and totalizing the units represented by the counting signals until the total is a number corresponding to a composed justifiable line of selected matrices of the selected font. Consequently, the absolute unit used in the present invention is the same for all fonts used.

In the preferred method of the present invention, the absolute unit is the product of the point number of the typographical basis, for example twelve points, and of the reciprocal of an integer number, such as 96, which is a binary multiple of the point number of the typographical basis, so that the binary em quad fractions of matrices of each of the fonts of matrices, for example, of the em quad and of the half em quad matrices, are accurately represented by an integer number, which is a multiple of said absolute unit.

In a modified form of the method of the present invention, the absolute unit is the product of the point number of one of the fonts, for example twelve points, and of the reciprocal of an integer number which is a common multiple of the point numbers of em quad point fractions of each of the fonts of matrices, for example of the em quad point number and of the half em quad point number of the respective font.

The selection of the twelve point font as counting basis of the system is particularly advantageous if the unit is made the 96th part of the counting basis which results in a good compromise between the desired exactness of the counting and the expenditures involved.

In automatic composing and typesetting operations, frequently fonts up to twelve point fonts are used so that the unit used in the method of the present invention is up to one third of the relative unit used in arrangements of the prior art, such relative unit being, for example, one thirty-second of the point number of the twelve point font. A unit corresponds to the smallest difference between two counted values. If the method of the prior art is applied to a six point font, one relative unit is the thirty-secondth part thereof, while the absolute unit of the present invention is one forty-eighth of the six point em quad, and consequently substantially smaller, permitting a more accurate counting and indication of the thicknesses of the matrices.

If an even higher accuracy is desired the 192th part of the em quad is used as counting basis in the method of the present invention, a binary code being used. On the other hand the 48th part of the em quad may be used as counting unit if lesser accuracy is satisfactory.

For comparison purposes, the following numerical example is given in points according to the typographical system. The thickness of a selected matrix is assumed to be seven points. Twelve points is selected as counting bais, and 96 is selected as a binary multiple of the point number of the counting basis.

Thickness	7 points.
Counting basis	12 points.
Unit	$12/96=1/8$.
Counted number	$7/1/8=56$.

The present invention combines the advantages of the absolute and relative counting systems, i.e. an increased accuracy independent of the em quad point number, and a very easy change of the point number during selection of the matrices without a change in the adjustment of the perforator.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of the specific embodiments when read in connection with the accompanying drawings, in which:

FIG. 1 is a diagram illustrating a perforator according to the present invention;

FIG. 2 illustrates a printed line made from a first font of matrices; and

FIG. 3 illustrates a printed line made from another font of matrices.

The perforator system illustrated in FIG. 1 is of the well known type disclosed, for example, in the French Patent 1,254,424 and in the U.S. Patent 3,083,897. It is operated by the keys of a keyboard **1** and controlled by the control means **2**. The keys of the keyboard are respectively associated with characters, numbers and symbols, and some keys are provided to control additional functions. Control means **2** includes key operated switches for selecting registers and magazines, and other switches, such as the main switch of the apparatus.

The keyboard **1** and the control means **2** are connected to a coding device **3** for a perforating device **4** which makes coded perforations in the tape **5**, and is preferably controlled by electromagnetic means.

Keyboard **1** and control means **2** are also connected to a switching device **7**, for example, an electric switching matrix, which is connected with for example four counter registers **8**.

The counter registers **8** may comprise multiple units associated with different fonts whose input terminals are connected to the key switches of the keyboard **1** and also to output terminals, respectively, of switching device **7** representing certain matrices of a particular thickness. Magnetic record carriers, punched cards, or punched tape may be used instead of the counting registers.

The output signals created at the output terminals of the registers **8** and representing matrix thickness in numerical values are supplied to a coding device **9** where they are coded and supplied to a totalizer **10** having an indicating means **11** which indicates when the composed lines can be justified.

When a key of keyboard **1** is actuated, perforations representing the respective matrix are made on tape **5**, and at the same time a numerical value representing the respective selected matrix is entered into the totalizer **10**.

Since the matrices of different fonts of matrices are of different thickness, even if associated with the same character, several registers **8** are provided the several fonts which are selected by the keys of control means **2** and by switching device **7** so that the correct numerical value corresponding to the selected matrix and font expressed in the absolute units of the inventions is entered through coding device **9** into the totalizer **10**.

The totalizer **10**, is preferably an electronic counter which is capable to count also values which are not strictly binary.

A presetting device **6** serves the purpose of setting the totalizer to an initial position corresonding to the length of the desired line, which may be obtained by controlling the several stages of the totalizer **10** by direct voltages to assume a certain position.

The indicating means **11** indicates the total registered in the totalizer preferably in such a manner that the space still available in the line for justification is indicated, for example by signal lights or pointers. When the indicated total expressed in the absolute units of the invention corresponds to the predetermined number required for a justifiable line, the next line is started.

FIGS. 2 and 3 illustrate two composed lines of 18-point matrices of two fonts in which the matrices have different thicknesses.

The matrix thickness for the first word and for the numerals at the end of the lines are indicated in point numbers and in units according to the present invention. The unit is selected to be the ninety-sixth part of the typographical 12-point unit. The numbers at the ends of the line in FIG. 2 have a thickness of seven points, and the numbers at the end of the line in FIG. 3 have a thickness of eight points so that the counter values **56** and **64**, respectively, correspond exactly to the actual thickness of the respective matrices. The same is true for the em quad matrices and half em quad matrices so that, particularly when tables have to be printed, a very precise spacing of columns is possible.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of typesetting methods differing from the types described above.

While the invention has been illustrated and described as embodied in a method for representing the thicknesses of matrices by an absolute unit, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. A composing method for line casting apparatus, comprising, in combination, selecting matrices from one selected font of matrices of a plurality of fonts of matrices, some of said fonts having different em quad point numbers and including matrices whose point numbers are binary fractions of the respective em quad number; producing a counting signal for each selected matrix representing the thickness of each selected matrix by a number expressed by a multiple of an absolute unit which is the product of the em quad number of the selected font and of the reciprocal of an integer number being a binary multiple of said em quad number so that each counting signal produced by a matrix of the selected font whose point number is a binary fraction of said em quad number represents an integer multiple of said absolute

unit; and totalizing the units represented by said counting signals until the total expressed in said units corresponds to a predetermined number of said units required for a composed justifiable line of selected matrices.

2. A composing method for typesetting apparatus, comprising, in combination, selecting matrices from one selected font of matrices of a plurality of fonts of matrices, some of said fonts having different em quad point numbers; producing a counting signal for each selected matrix representing the thickness of each selected matrix by a number expressed by a multiple of an absolute unit being the product of the em quad thickness of one of said fonts and of the reciprocal of an integer number which is a common multiple of the point numbers of em quad fractions of each of said fonts of matrices so that each counting signal represents an integer multiple of said absolute unit irrespective which font is selected; and totalizing the units represented by said counting signals until the total expressed in said units corresponds to a predetermined number of said units required for a composed justifiable line of selected matrices.

3. A composing method for typesetting apparatus, comprising, in combination, selecting matrices from one selected font of matrices of a plurality of fonts of matrices, some of said fonts having different em quad point numbers; producing a counting signal for each selected matrix representing the thickness of each selected matrix by a number expressed by a multiple of an absolute unit being the product of the em quad thickness of one of said fonts being the typographical basis and of the reciprocal of an integer number which is a binary multiple of the point number of the typographical basis so that the binary em quad fractions of each of said fonts of matrices are accurately represented by an integer number which is a multiple of said absolute unit; and totalizing the units represented by said counting signals until the total expressed in said units corresponds to a predetermined number of said units required for a composed justifiable line of selected matrices.

4. A composing method for typesetting apparatus, comprising, in combination, selecting matrices from one selected font of matrices of a plurality of fonts of matrices, some of said fonts having different em quad point numbers; producing a counting signal for each selected matrix representing the thickness of each selected matrix by a number expressed by a multiple of an absolute unit being the product of the em quad thickness of one of said fonts being the typographical basis and of the reciprocal of an integer number which is a multiple of the point number of the typographical basis so that the em quad fractions of each of said fonts of matrices are accurately represented by an integer number which is a multiple of said absolute unit; and totalizing the units represented by said counting signals until the total expressed in said units corresponds to a predetermined number of said units required for a composed justifiable line of selected matrices.

5. A composing method for typesetting apparatus, comprising, in combination, selecting matrices from one selected font of matrices of a plurality of fonts of matrices, some of said fonts having different em quad point numbers; producing a counting signal for each selected matrix representing the thickness of each selected matrix by a number expressed by a multiple of an absolute unit being the product of the em quad thickness of one of said fonts and of the reciprocal of an integer number which is a multiple of the em quad point number of at least one of said fonts so that each counting signal represents an integer multiple of said absolute unit irrespective which font is selected; and totalizing the units represented by said counting signals until the total expressed in said units corresponds to a predetermined number of said units required for a composed justifiable line of selected matrices.

6. A composing method for typesetting apparatus, comprising, in combination, selecting matrices from one selected font of matrices of a plurality of fonts of matrices, some of said fonts having different em quad point numbers; producing a counting signal for each selected matrix representing the thickness of each selected matrix by a number expressed by a multiple of an absolute unit being the product of the em quad point number of one of said fonts and of the reciprocal of an integer number which is a multiple of the em quad point number of at least one of said fonts so that the em quad fractions of each of said fronts of matrices are accurately represented by an integer number which is a multiple of said absolute unit; and totalizing the units represented by said counting signals until the total expressed in said units corresponds to a predetermined number of said units required for a composed justifiable line of selected matrices.

7. A composing method for typesetting apparatus, comprising, in combination, selecting matrices from one selected font of matrices of a plurality of fonts of matrices, some of said fonts having different em quad point numbers; producing a counting signal for each selected matrix representing the thickness of each selected matrix by a number expressed by a multiple of an absolute unit being the product of the em quad point number of a 12 point font being the typographical basis and of the reciprocal of an integer number which is a multiple of the point number of the typographical basis so that the em quad fractions of each of said fonts of matrices are accurately represented by an integer number which is a multiple of said absolute unit; and totalizing the units represented by said counting signals until the total expressed in said units corresponds to a predetermined number of said units required for a composed justifiable line of selected matrices.

8. A composing method for typesetting apparatus, comprising, in combination, a selecting matrices from one selected font of matrices of a plurality of fonts of matrices, some of said fonts having different em quad point numbers; producing a counting signal for each selected matrix representing the thickness of each selected matrix by a number expressed by a multiple of an absolute unit being the product of the em quad point number of a 12 point font being the typographical basis and of the reciprocal of 96 which is a binary multiple of the point number of the typographical basis so that the binary em quad fractions of each of said fonts of matrices are accurately represented by an integer number which is a multiple of said absolute unit; and totalizing the units represented by said counting signals until the total expressed in said units corresponds to a predetermined number of said units required for a composed justifiable line of selected matrices.

9. A method of operating the perforator of a line casting machine, comprising, in combination, successively creating signals representing selected matrices; effecting by said signals simultaneous perforation of a tape by coded representations of the selected matrices and entry of numerical values representing selected matrices into a totalizer, said matrices being selected from a font including matrices whose point numbers are binary fractions of the respective em quad number, said numerical values being expressed in an absolute counting unit which is the product of the em quad number of a font of matrices and of the reciprocal of an integer number being a binary multiple of said em quad number so that the thickness of the em quad matrices and of the half em quad matrices expressed in said unit to form said numerical values are integer multiples of said unit.

10. A method of operating the perforator of a line casting machine, comprising in combination, successively creating signals representing selected matrices; effecting by said signals simultaneous perforation of a tape by

coded representations of the selected matrices and entry of numerical values representing selected matrices into a totalizer, said matrices being selected from a font including matrices whose point numbers are binary fractions of the respective em quad number said numerical values being expressed in an absolute counting unit which is the product of the typographical point number of a font of matrices and of the reciprocal of an integer number being a binary multiple of said typographic point number so that the thickness of the em quad matrices and of the half em quad matrices expressed in said unit to form said numerical values are integer multiples of said unit, and so that the typographic point number of the matrices forming the counting basis is an integer multiple of said unit.

11. A method of operating a perforator for the program tape of a type setting machine to record the program of a line to be composed, comprising, in combination, producing signals representing matrices to be selected from a plurality of fonts having different em quad point numbers, said signals representing the thickness of each selected matrix by a numerical value which is a multiple of an absolute unit being the product of the em quad thickness of one of said fonts and of the reciprocal of an integer number which is a common multiple of the point numbers of em quad fractions of at least one of said fonts of matrices so that each signal represents an integer multiple of said absolute unit; effecting by said signals perforation of a tape by coded perforations representing the selected matrices; simultaneously effecting entry of said numerical values into a totalizer; and totalizing said numerical values until the total expressed in said units corresponds to a predetermined number of said units required for a composed justifiable line of selected matrices.

12. A method of operating a perforator for the program tape of a type setting machine to record the program of a line to be composed, comprising, in combination, producing signals representing matrices to be selected from a plurality of fonts having different em quad point numbers, said signals representing the thickness of each selected matrix by a numerical value which is multiple of an absolute unit being the product of the em quad thickness of one of said fonts being a typographical basis, and of the reciprocal of an integer number which is a binary multiple of the point number of said typographical basis so that each signal represents binary em quad fractions of each of said fonts as an integer multiple of said absolute unit; effecting by said signals perforation of a tape by coded perforations representing the selected matrices; simultaneously effecting entry of said numerical values into a totalizer; and totalizing said numerical values until the total expressed in said units corresponds to a predetermined number of said units required for a composed justifiable line of selected matrices.

13. A method of operating a perforator for the program tape of a type setting machine to record the program of a line to be composed, comprising, in combination, producing signals representing matrices to be selected from a plurality of fonts having different em quad point numbers, said signals representing the thickness of each selected matrix by a numerical value which is a multiple of an absolute unit being the product of the em quad thickness of one of said fonts and of the reciprocal of an integer number which is a common multiple of the point numbers of em quad fractions of at least one of said fonts of matrices so that each signal represents an integer multiple of said absolute unit; effecting by said signals perforation of a tape by coded perforations representing the selected matrices; simultaneously supplying the signals correlated to different fonts to registers respectively correlated with said different fonts and producing output signals representing the respective numerical value for each selected matrix of the respective font in said absolute units; entering said output signals as numerical values into a totalizer; and totalizing said numerical values until the total expressed in said units corresponds to a predetermined number of said units required for a composed justifiable line of selected matrices.

14. A method of operating a perforator for the program tape of a type setting machine to record the program of a line to be composed, comprising, in combination, producing signals representing matrices to be selected from a plurality of fonts having different em quad point numbers, said signals representing the thickness of each selected matrix by a numerical value which is a multiple of an absolute unit being the product of the em quad thickness of one of said fonts and of the reciprocal of an integer number which is a common multiple of the point numbers of em quad fractions of at least one of said fonts of matrices so that each signal represents an integer multiple of said absolute unit; effecting by said signals perforation of a tape by coded perforations representing the selected matrices; simultaneously effecting entry of said numerical values into a totalizer; indicating the total expressed in said units; and totalizing said numerical values until the indicated total expressed in said units corresponds to a predetermined number of said units required for a composed justifiable line of selected matrices.

15. A method of operating a perforator for the program tape of a type setting machine to record the program of a line to be composed, comprising, in combination, producing signals representing matrices to be selected from a plurality of fonts having different em quad point numbers, said signals representing the thickness of each selected matrix by a numerical value which is multiple of an absolute unit being the product of the em quad thickness of one of said fonts and of the reciprocal of an integer number which is a common multiple of the thickness of em quad fractions of each of said fonts of matrices so that each signal represents an integer multiple of said absolute unit; effecting by said signals perforation of a tape by coded perforations representing the selected matrices; simultaneously effecting entry of said numerical values into a totalizer; and totalizing said numerical values until the total expressed in said units corresponds to a predetermined number of said units required for a composed justifiable line of selected matrices.

16. A method of operating the perforator of a line casting machine, comprising, in combination successively creating signals representing selected matrices; effecting by said signals simultaneous perforation of a tape by coded representations of the selected matrices and entry of numerical values representing selected matrices into a totalizer, said numerical values being expressed in an absolute counting unit which is the 96th part of a typographic point number of 12 points so that the thickness of em quad matrices and of the half em matrices expressed in said unit to form said numerical values are integral multiples of said unit, and so that the typographic point number of the matrices forming the counting bases is an integer multiple of said unit.

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