Oct. 19, 1926. 1,603,953

E. K. HUNTER

PUNCHING CONTROL STRIP FOR PHOTOGRAPHIC COMPOSING MACHINES

Original Filed Sept. 20, 1922 3 Sheets-Sheet 1

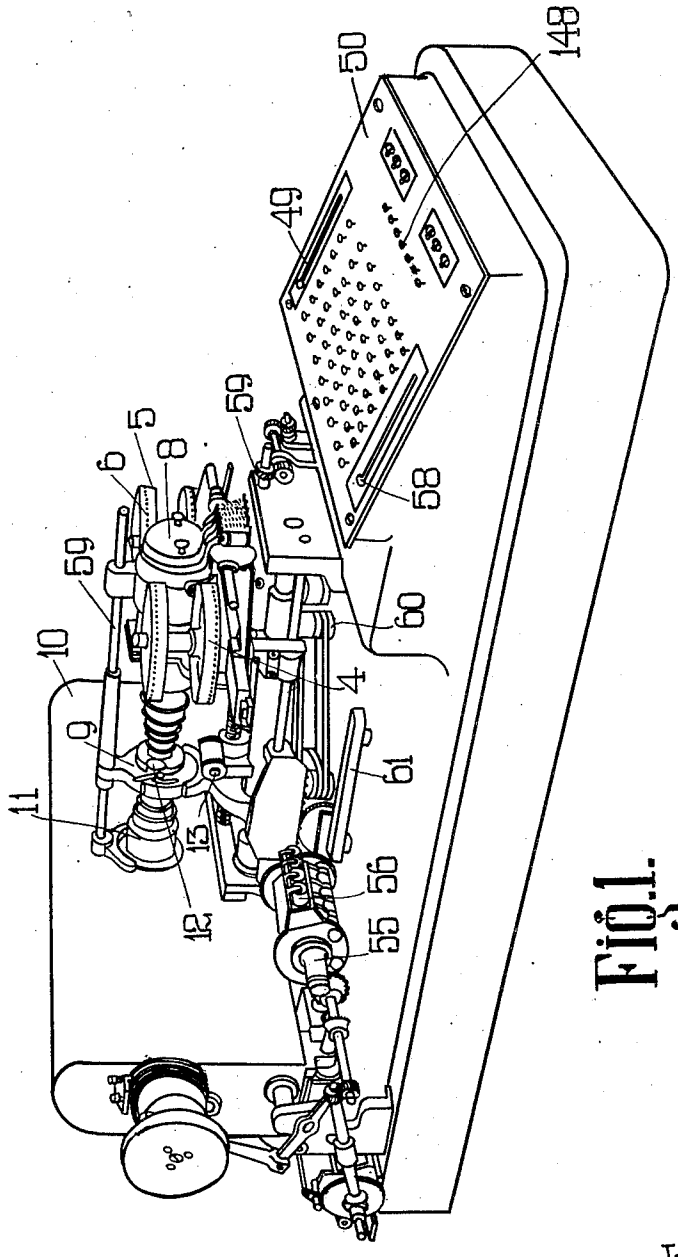


Fig. 1.

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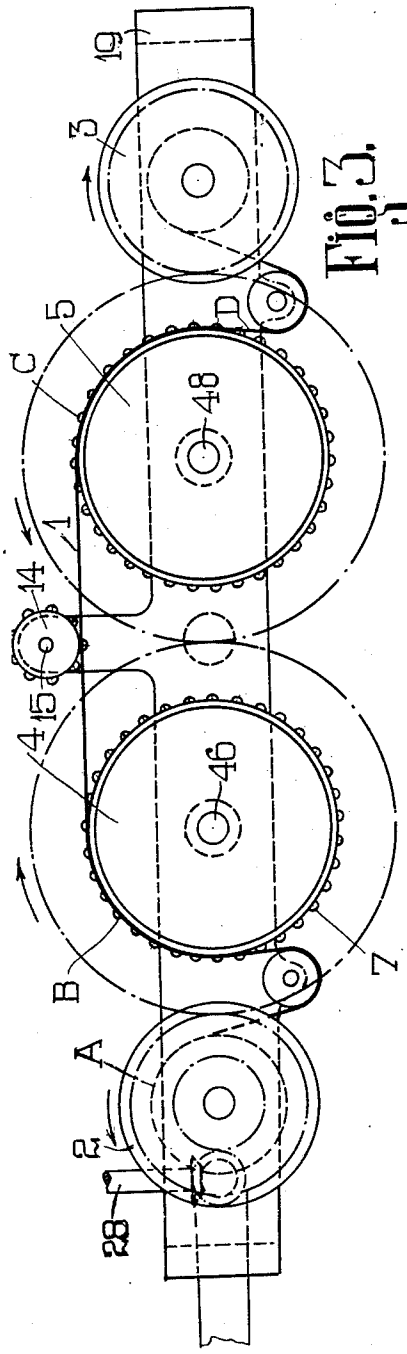


Fig. 3.

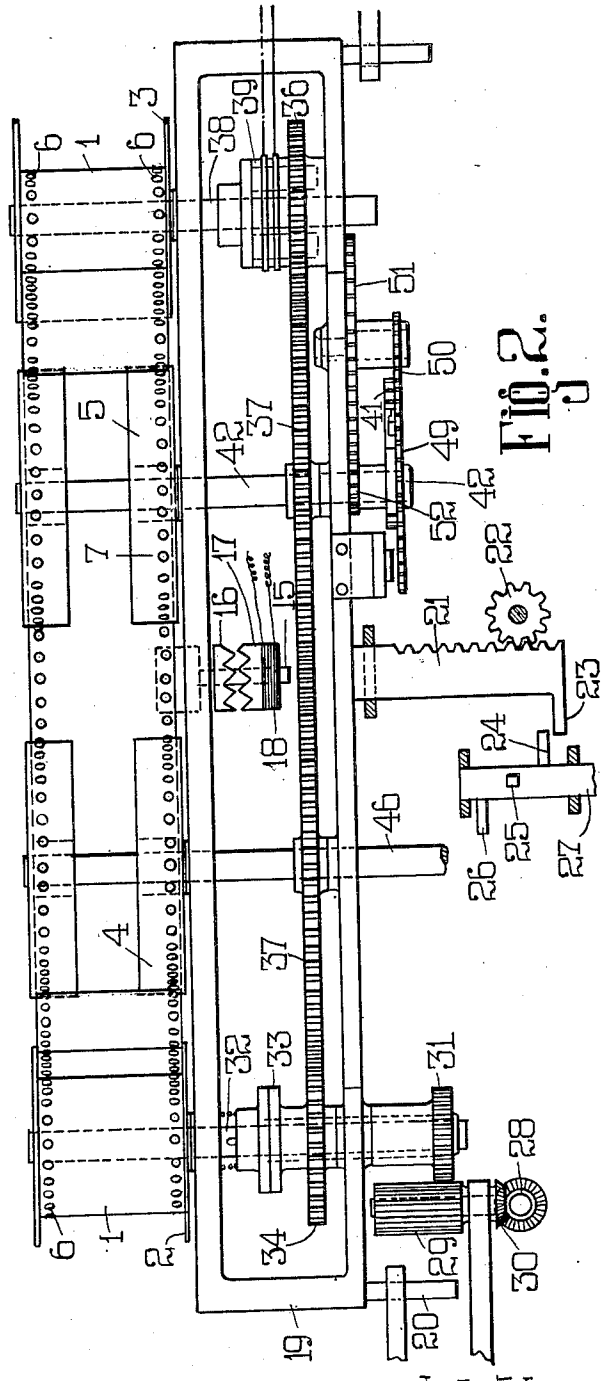


Fig. 2.

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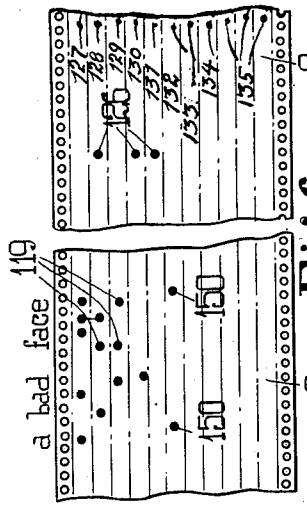


Fig. 6.

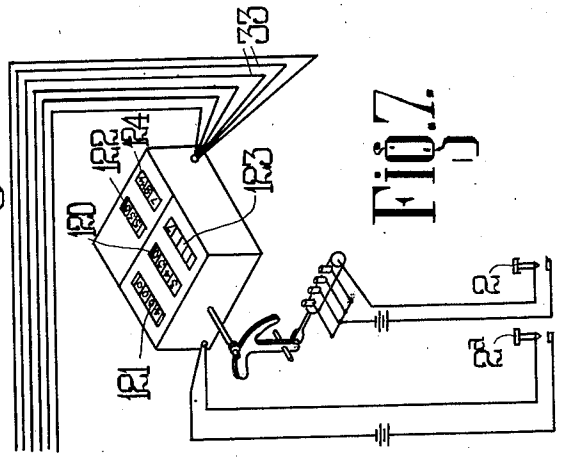


Fig. 7.

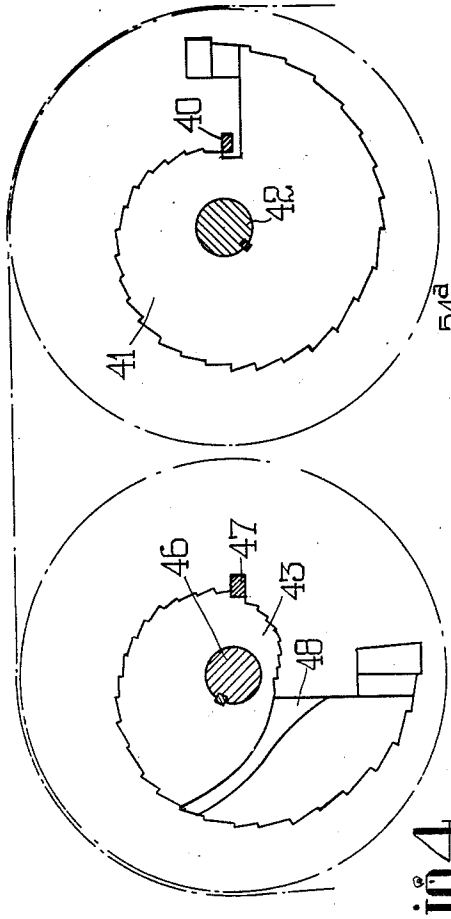


Fig. 4.

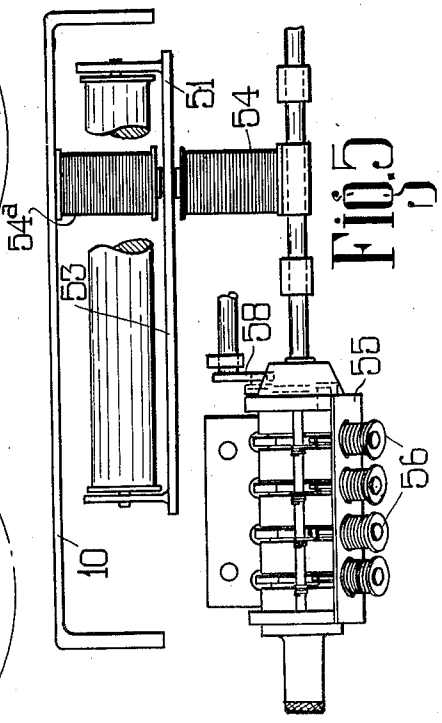


Fig. 5.

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Patented Oct. 19, 1926. 1,603,953

UNITED STATES PATENT OFFICE.

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PUNCHING CONTROL STRIP FOR PHOTOGRAPHIC COMPOSING MACHINES.

Original application filed September 20, 1922, Serial No. 589,365, and in Great Britain September 21, 1921. Divided and this application filed December 18, 1925. Serial No. 76,287.

The present invention relates to improvements in photographic composing machines of the type in which characters or symbols on a partially light opaque stencil are brought one at a time into the optical axis of a photographic camera to be photographed upon a sensitive surface for subsequent photographic reproduction for printing purposes.

This application is a division of my co-pending application Ser. No. 589,365, filed Sept. 20, 1922, to which reference is made for further detail of the constructional features referred to herein.

According to the present invention, the control of the machine is effected from the punched strip. A portion of this strip is divided into longitudinal areas the punched holes in which have a value in the ratio of the geometrical progression 1, 2, 4, 8, 16, 32 . . .. In the remaining area of the strip, the punched holes are provided for indicating word spacing, a change of case, a change of style, a change of size and finally a further area of the punched strip is set aside at spaced intervals for the reception of punchings indicating the justified amount of word spacing standard for each line of composed matter.

The invention will be more particularly described with reference to the accompanying drawings in which:—

Figure 1 is a diagrammatic view of a photographic composing machine.

Figure 2 is an elevation of the film carrier.

Figure 3 is a corresponding plan view.

Figure 4 is a diagrammatic view of the positioning mechanism for the film spools.

Figure 5 is a detail of the spacing mechanism operated by the strip of Figure 6.

Figure 6 shows a portion of one form of record or control strip.

Figure 7 is a diagrammatic view of the justification mechanism.

A flexible film 1 is carried on supply spools 2, 3, and is led over guide spools 4, 5. The film 1 is notched as at 6 on its periphery to engage with fitting and spacing teeth 7 on the guide spools. The film 1 is of the type of my co-pending patent application.

It will be convenient for the film to carry three rows of characters "upper case", "lower case" and "peculiars". One letter only of such characters at any one time will, however, intersect the light path of a camera or projection system comprising a source of light within a casing 8, and a projection lens in a carrier 9 which is united to the light tight casing 8, and the casing 10 enclosing the surface on which the characters are to be photographed by means of telescopic extension casings 11.

The lens carrier 9 is provided with a shutter 12 operated by an electromagnet 13.

The film 1 is divided up into virtual areas each area including all the characters of upper and lower case and peculiars of one style, one area by way of example including "Roman" characters, whilst another area includes "italics" and so forth.

The perforations 6 of the film also engage a fixing or locating wheel 14. Rigid on the shaft 15 of this wheel is a toothed disc 16 whilst below it normally lies a correspondingly toothed disc 17 connected to an electromagnet 18. When this electromagnet 18 is energized the discs 17 and 16 lock together and fix the film 1 accurately so that a selected character upon it lies in the light path of the camera 8, 9, 11. The purpose of the discs 16 and 17 is to bring the film into accurate alignment to compensate for expansion or contraction of the film which may occur. As three rows of characters are carried by the film, it is necessary to raise it into one of two positions other than its normal position. This may be effected by mounting the frame 19 carrying the spools 2, 3, 4, 5, on guides 20 and providing a rack 21 on it. This rack 21 is displaced by a pinion 22 driven through friction gearing capable of slip. A stop pin 23 on the rack 21 is adapted to abut against either stop 24 or stop 25 or stop 26 as the case may be, these stops being carried on the spindle 27 rotatable about its own axis. When for instance an upper case character is required, the stop 26 is effective, when a lower case character is required, stop 25 is effective and when a "peculiar" is required, then stop 24 is effective in maintaining the frame 19 in a position such that the lower row of characters is in the plane of the light beam. To displace the film from one position to another along its length, a drive, preferably through an

overload clutch such as a friction drive capable of slip is provided to the spindle 28 driving the long pinion 29 through bevel gearing 30. The long pinion 20 is constantly in mesh with the pinion 31 in the three separate positions of the frame 19. This pinion 31 is loose on the shaft 32 carrying the film spool 2 which it drives through friction clutch 33, but the pinion 31 is fast with the pinion 34 driving a pinion 36 through wheels 37. Pinion 36 is loose on the shaft 38 of the film spool 1 which it can drive whenever an electro-magnetic clutch 39 is energized; this clutch 39 is more powerful than the clutch 33. When the film is being displaced from the left to right, clutch 39 is operative against the frictional drag of clutch 33. When the film is displaced from right to left, clutch 33 alone is operative.

For displacing the film from one area to another, drive is imparted to the shaft 38 through clutch 39 until the shaft 42 coaxial with the shaft 42ª of the film spool 5 reaches a position accurately set by a stop pin 40 (Fig. 4). This stop pin 40 is accurately positioned preferably by setting mechanism according to the co-pending application, #602,475, filed on Nov. 21, 1922 by J. R. C. August and myself. This stop pin 40 acts as a variable radial abutment for a snail cam 41. A similar snail cam 43 is provided on the shaft 46 of the film spool 4. A stop 47 co-operates with the snail cam 43, allowing in the arrangement illustrated a choice of thirty-four characters. A slot 48 is provided in the cam 43 to allow free rotation of this counter-clockwise during the time that the film is passing from one style to another. The cam 41 on the shaft 42 is connected with the spindle 42ª of the guide spool 5 through gearing 49, 50, 51 and 52, whereby a cam 41 of small proportions can be used in spite of the fact that the film spool 5 has to rotate many times in passing from one style to another.

By displacing a lever 49 on the keyboard 50 a punching is made in a control strip which subsequently co-operates with brushes to energize one or more coils of a setting mechanism which may be similar to that of the joint co-pending application #602475 above referred to to operate the setting of the stop 40 so that the film is displaced on its spools 4 and 5 until the area corresponding to the style desired lies between these spools, the spools 4 and 5 revolving until arrested by the cam 41 meeting the stop 40.

A punching 119 (Fig. 6) will electro-magnetically operate a setting mechanism of the type of application #602,475 to displace the stop 47 to set the character desired whilst the electro-magnetic clutch 39 is then energized to allow rotation of the film spool 3 until the cam 43 meets the stop 47. The punching 119 further operates to break the circuit of an electro-magnet 54ª locking the carriage 53 within the casing 10 to this casing whilst energizing the electro-magnet 54 locking the carriage 53 to the shaft of a setting mechanism 55 (the construction of which is fully described in the joint co-pending application #602,475). One or more of the electro-magnets 56 of this setting mechanism are then energized to cause the displacement of the carriage 53 through one half space. This carriage 53 carries the light sensitive surface on which the image of the character is to be photographed.

Thereupon the circuit to coil 54 is broken while that to coil 54ª is made and the circuit to coil 13 made which opens the shutter and operates the photographing of the selected character.

It is evident that after the shutter has closed the carriage 53 must be again displaced onwards by one half of the spacing for the particular character selected as of course the character must always be photographed in the middle of the letter or character spacing which it occupies. Consequently as punching 119 leaves the brush through which the operative control circuit is made, the circuit of the particular electro-magnet or electro-magnets 56 will again be closed during the time that the carriage 51 is released from electro-magnet 54ª and connected again momentarily to electro-magnet 54.

Whenever it is desired to enlarge or reduce the scale of reproduction of a character on the film 1, a lever such as 58 on the keyboard 50 can be displaced operating the relative displacement of the lens carrier 9 and frame 19 with film spools 45 and light source 8 along the guides 59, the necessary optical relationship of these parts being governed by toggle linkage 60 and cams 61. This mechanism forms no part of the present invention.

Supposing that the strip 9 (Fig. 6) be divided into longitudinal areas 127, 128, 129, 130, 131, 132, 133, 134 and 135 then suppose that a punching in area 127 indicates a code value, one, in area 128 a value two, in area 129 a value four, in area 130 a value eight, and in area 131 a value sixteen, then it will be seen that if different values be assigned to different letters the said strip 9 can select any letter desired. In the example illustrated a possibility of thirty-two characters is available and for instance character :—

a may have value one, *b* may have value two, *c* may have value three, *d* may have value four, *e* may have value five, *f* may have value six, *g* may have value seven, *h* may have value eight, *i* may have value nine, *j* may have value ten, *k* may have value eleven, and so forth.

Supposing therefore the character "*g*" is selected then punchings will be present in

127, 128 and 129, Figure 3. If character "*d*" be taken, then there will be a single punching in row 129 and so forth.

As each word is punched in the strip 9 a spacing key 149 is depressed causing the punching of a hole 150 in row 132 of the strip 9. At the end of each line the operator presses a key 148 to operate a row of punchings 126 in another portion of the control strip for co-operating with the word spacing punching 150 for word justification.

As each letter is punched by the setting up of a lateral row of punchings 119, a number wheel 120 Figure 7 is turned to add to that wheel counting mechanism a value equal to the width of the desired character, the total available width of line being indicated on counter 123. The difference between these counters 120, 121 is automatically recorded on counter 122'. The depression of the key 2^a operating the punchings 150 also sets up the number of words in a line on counter 123. At the end of a line the value on counter 122' is automatically divided by means of any well-known calculating machine mechanism in the counter box by the value on counter 123 to show the amount of justification on counter 124, that is to say, the amount by which the receptive surface must be displaced at each word end so that the whole printed line appears symmetrical as regards the disposition of the words therein. The operator then presses a key or keys 2^b to operate a row of punchings 126 in another consecutive portion of the control strip 9. It will be preferred to arrange the strip 9 in this portion to be divided into areas 127, 128, 129, 130, 131, 132 equal in value to terms of the geometrical serial 1, 2, 4, 8, 16, 32 . . . so that by suitably grouping the punchings any desired spacing from unity to the sum of the terms, in this case sixty-four, is available.

Now a brush moving along area *f* at the completion of each printed word will operate the displacement of the carriage with the receptive surface on which the characters are to be printed by the amount of word justification necessary, set up once for each line. The six conductors 33 may be used to automatically operate the punchings 126 in the strip 9 by energizing suitably disposed punching electro-magnets.

At the end of each printed word therefore contact brushes co-operating with punching 150 operate one or more of the coils of a setting mechanism, the number of which has already been set by the punching 126.

I declare that what I claim is:—

1. As an article of manufacture a punched control strip for a photographic composing machine having code punchings disposed in adjacent areas equivalent to values of a geometrical progression.

2. As an article of manufacture a punched control strip for a photographic composing machine having code punchings disposed in adjacent areas equivalent to value of the fundamental geometrical progression 1, 2, 4, 8, 16, 32, 64 . . ..

3. As an article of manufacture a punched control strip for a photographic composing machine having code punchings disposed in longitudinal adjacent areas equivalent to value of the fundamental geometrical progression 1, 2, 4, 8, 16, 32, 64 . . ..

4. As an article of manufacture a punched control strip for a photographic composing machine having punchings for operating the displacement of a character stencil relatively to a photographic camera, a second set of punchings for displacing the light sensitive surface upon which photographic images are received relatively to said camera and a third set of punchings controlling the relative disposition of image projecting lens and object of said camera to vary the size of image projected.

5. As an article of manufacture a punched control strip for photographic composing machines having punchings for the selection of a character to be brought into the path of a photographic camera, a second set of punchings to select the style of character, a third set of punchings to select the size of optical projection of the character, a fourth set of punchings to control the word spacing of the characters photographed.

6. As an article of manufacture a punched control strip for photographic composing machines having punchings for the selection of a character to be brought into the path of a photographic camera, a second set of punchings to select the style of character, a third set of punchings to select the size of optical projection of the character, a fourth set of punchings to control the word spacing of the characters photographed, a fifth set of punchings to establish a value for each line for the word spacing.

7. As an article of manufacture a punched control strip for photographic composing machines having punchings for the selection of a character to be brought into the path of a photographic camera, a second set of punchings to select the style of character, a third set of punchings to select the size of optical projection of the character, a fourth set of punchings to control the word spacing of the characters photographed, a fifth set of punchings to establish a value for each line for the word spacing and a sixth set of punchings controlling the correction of an erroneously selected character.

8. As an article of manufacture a punched control strip for photographic composing machines having punchings for the selection of a character to be brought into the path of a photographic camera, a second set of

punchings to select the style of character, a third set of punchings to select the size of optical projection of the character, a fourth set of punchings to control the word spacing of the characters photographed, a fifth set of punchings to establish a value for each line for the word spacing, and a sixth set of punchings controlling the correction of an erroneously selected character, and a seventh set of punchings controlling the step by step displacement of the light sensitive surface upon which the photographic image is projected according to the varying width of character.

9. As an article of manufacture a punched control strip for photographic composing machines having punchings arranged in sequence for the selection of a character, a single punching at the end of each number of separate groups of punchings forming composed words and a group of punchings at the end of punchings corresponding to a line of composed matter for setting a justification value to operate whenever controlled by the single punching indicating the end of a word.

10. As an article of manufacture for use with a photographic composing machine a punched record control strip divided into a number of virtually controlled areas according to values of the fundamental geometrical progression so that a limited number of areas corresponds to a large number of visible varying control operations, the first set of punchings in said areas to select the characters and a second set of punchings in said areas to set up a justified value for the spacing of words composed.

11. As an article of manufacture for use with a photographic composing machine, a punched record control strip, divided into separate areas of equal extent, one area receiving punchings operating the normal control of selection and spacing of characters to be composed, whilst the other area operates as a master control for the correction of punchings in the first named area.

In witness whereof, I have hereunto signed my name this 4th day of December, 1925.

EDGAR KENNETH HUNTER.