United States Patent [19]

Linde

[11] **3,769,885**

[45] **Nov. 6, 1973**

[54] **DEVICE FOR EXPOSURE OF PHOTOMATERIAL IN HAND-OPERATED PHOTOCOMPOSING DEVICES**

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[22] Filed: **July 26, 1972**

[21] Appl. No.: **275,121**

[30] **Foreign Application Priority Data**

July 26, 1971 Germany..... P 21 37 934.0

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

[51] **Int. Cl.**..... **B41b 15/32**, B41b 17/40

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

[56] **References Cited**

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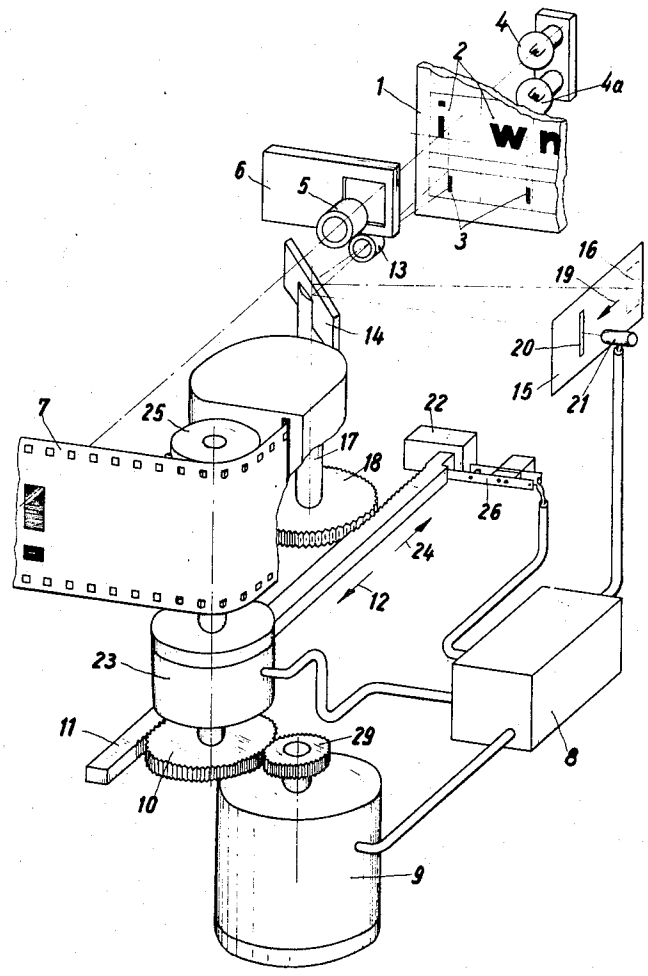
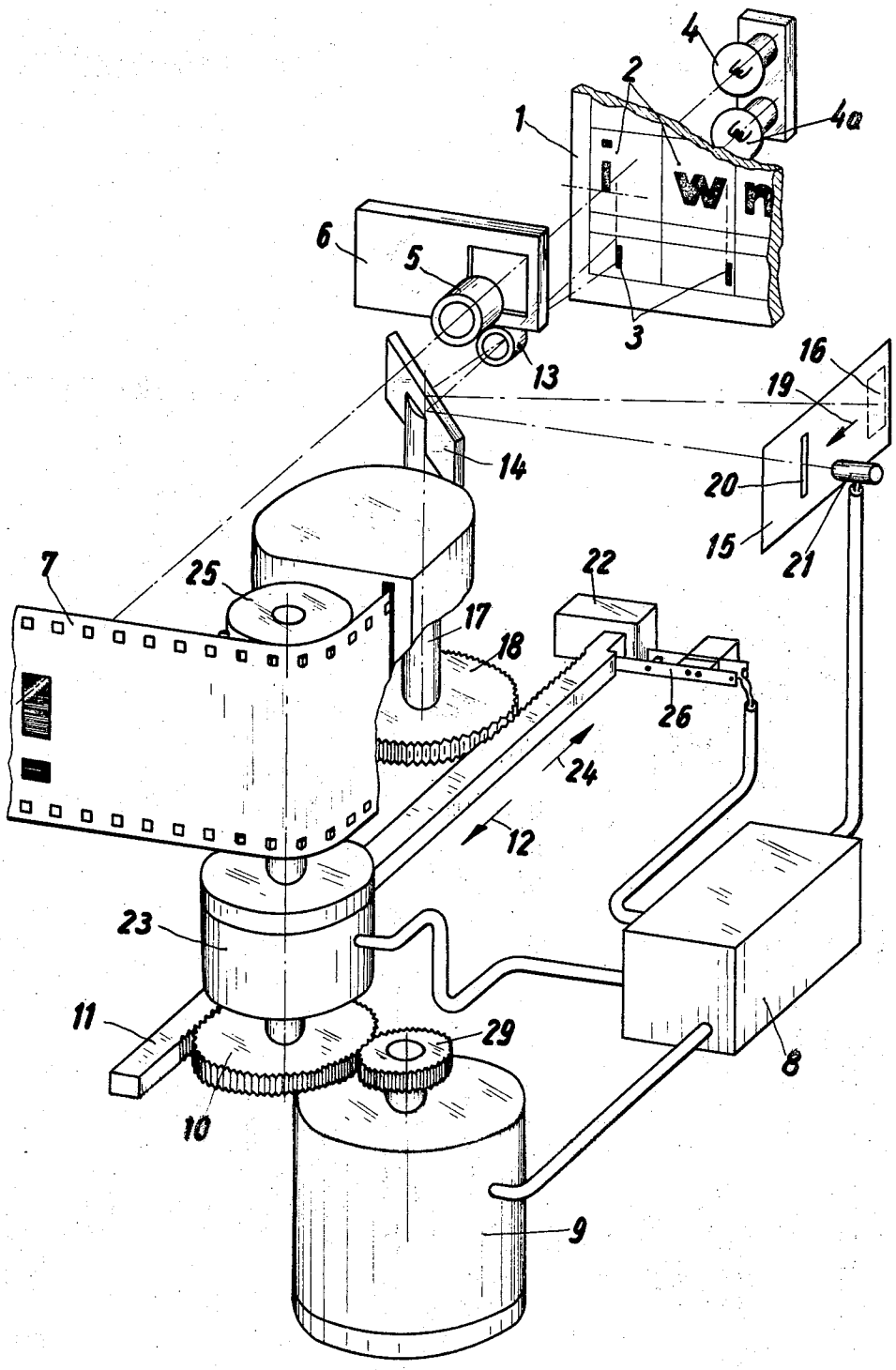
[57] **ABSTRACT**

Device for the photographic composition of characters with random widths which are not divisible into sub-units, which are determined by control marks on a character support associated with the characters, and which control marks control advance of a film by means of a sensing device, before the character support is subsequently released and the next character can be brought into a projected position, a pivoting mirror being disposed in the beam path of an optical sensor for a width mark together with a reversing motor which is actuatable in a given direction by an electronic control simultaneously with the illumination of a symbol, and is connected via toothed gears with a rack, one of the gears being directly coupled with the reversing motor and being connectable via a coupling to an element for the width shaft of a photo-layer support upon reversal of rotation of the reversing motor, after the width value of the symbol to be set-in has been stored by opposed analog linear movement of the rack and the illumination of the symbol is completed.

2 Claims, 1 Drawing Figure

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DEVICE FOR EXPOSURE OF PHOTOMATERIAL IN HAND-OPERATED PHOTOCOMPOSING DEVICES

This invention relates to a device for the photographic setting of type with random widths that are not subdividable into sub-units, determined by control marks associated with the characters on the character support, which control marks control film advance by means of a sensing device before the support is subsequently released and the next character can be brought into the projection position, as generally set forth in commonly owned U.S. Pat. application Ser. No. 23,788 now U.S. Pat. No. 3,695,155 dated Oct. 3, 1972.

In the above-mentioned patent application, a hand-operated photocomposing device is disclosed in which symbols on the character support corresponding to the graphic configuration of the characters such as letters or the like present the most multifarious lengths that cannot be divided into discrete subdivisions, whereby there is a mark analogous to its width associated with each character. In accordance with the present invention, the composing step for each symbol or sign is shortened in that the exposure of the photolayer support and the width shift thereof no longer occur in temporally successive stages, but rather at the same time with the exposure of the character a storage of the width value is effected so that immediately after this storage and after conclusion of the exposure the next symbol can be selected, during which operation the width shift of the photolayer support can be effected.

In a preferred embodiment of a device for carrying out the invention according to the aforementioned patent, the sensing of the width mark analogous to the width of the set-in symbol is accomplished via an optical sensor comprising a lamp, a condenser, an objective, a pivoting mirror and a photoelectronic transducer, whereby the pivoting mirror is moved by means of a synchro motor via an electromagnetic coupling, a gear and a lever transmission until the width mark triggers a photoelectronic signal in the transducer, whereby the magnitude of the pivoting motion corresponds to the symbol in question in the size of the original.

The synchronous motor used in such device runs during the entire operating time of the photocomposing instrument, whereby connection of the mechanism for the pivoting mirror for storing the width value occurs simultaneously with the illumination of a symbol, and the electromagnetic coupling is again de-energized as soon as the optical image of the width mark falls on the photo-electric transducer via the pivoting mirror which continuously turns on a shaft. Since the synchro-motor that is used has only one direction of rotation, the width shift occurs after completion of the exposure process and the resetting of the storage device with de-energized connection, as the result of the intrinsic weight of a balance furnished especially for this purpose.

Starting with the information gained from the aforementioned patent, that the composing speed of a hand-operated photocomposing machine with random character or symbol widths can be increased without expensive shortening of the exposure time or of the speed of the width shift if the illumination of the symbol and the width shift of the photolayer support no longer occur in temporal succession but are overlapped in time by

intermediate storage, the present invention is directed to a further advantageous device of a similar type, which constitutes a further development and improvement upon the earlier filed patent.

The present preferred embodiment of a device for mechanical storage of analog width values in hand-actuated photocomposing devices during the exposure time is characterized in that the pivoting mirror that is disposed in the beam path of an optical sensor for the width mark is connected via toothed gears and a rack with the reversing motor that is actuatable in a predetermined direction by an electronic control, at the same time as the process of illumination of the symbol, by which arrangement the gear that is directly coupled with the reversing motor is connectable via a coupling to an element for width shift of the photolayer support upon reversal of the direction of rotation of the reversing motor, as the width of the symbol in question that is to be set is stored by opposed analog linear movement of the rack, and the illumination of the symbol is terminated.

In this connection it is important for the device arranged in such manner that the triggering of the reversing motor simultaneously with the illumination of the symbol, and therewith the displacement of the rack via a photoelectric transducer, be stopped after the image of the width mark deflected via the pivoting mirror has been aligned with it, and that the movement of the reversing motor for width shift in the opposite direction be interrupted by an end switch.

The sensing of the width mark by no means needs solely to be an optical sensing as in the present example. In general it can be effected in terms of the special nature of the width mark as a cam, perforation, photo mark or the like according to its length, thickness, position or even diameter, by mechanical, electric, magnetic or other suitable means, aside from the photo-optical.

The preferred device characterized in the above form for mechanical intermediate storing of widths which are not discrete is made of only a small number of mechanical parts which also may be commercially available finished parts such as gears, racks, etc.

The reversing motor that is used is actuated only during storage of the width value and in the reverse direction during the subsequent width shift, so that wear is minimal. The small number of structural parts makes the device of the invention little susceptible to damage, and absolutely reliable in function.

In the drawing, the device in accordance with the present invention is shown schematically in an example of an embodiment set forth in perspective.

Each symbol 2 in the form of a type character or the like can be disposed in the beam path of a light source 4 by a suitable setting of the symbol support for its projection onto a photolayer support 7. The character support 1 shown here partly broken away can be made in the form of a supporting plate or a rectangular support table. Each symbol 2 has associated with it a width mark 3 whose length, thickness or position with reference to a fixed zero point represents the actual width. Corresponding to the optical width sensing system of the present example, this element consists of a photographically applied mark. However, in general, with other types of sensing systems it can alternately comprise a cam, a perforation, magnetizing on a magnetic tape, or the like.

While symbol 2, brought into the beam path of light source 4 with opened shutter 6 corresponding to the duration of the exposure time, is directly and sharply formed via objective 5 on photolayer support 7, the optical sensor for width mark 3 operates a second light source 4a which throws the image of width mark 3 via objective 13 and pivoting mirror 14 onto a shield 15. Depending upon the zero setting of pivoting mirror 14 and upon the width value analogously associated with a symbol 2, image 16 of width mark 3 first impinges on any part of shield 15. With a triggering of the illumination process for symbol 2, i.e., with the opening of shutter 6, pivoting mirror 14 is simultaneously turned at a constant angular velocity about its shaft 17 so that image 16 moves on shield 15 in the direction of arrow 19 onto a slit 20. As soon as image 16 reaches slit 20, a pulse is developed on a photoelectric transducer 21, whereby the movement of rotation of pivoting mirror 14 is interrupted.

The rotation of pivoting mirror 14 synchronously with the illumination and projection of a symbol 2 onto the photolayer support 7, is effected via an electronic control 8. For this, electronic control 8 is connected to a reversing motor 9 or a braking motor whose pinion 29 on the output shaft thereof engages the teeth of a gear 10 which in turn are in engagement with the teeth of a rack 11. Diametrically opposite with reference to these teeth, rack 11 is provided with additional teeth as shown, which engage the teeth of a gear 18 that is in fixed connection with a shaft 17 of pivoting mirror 14.

With a triggering of the exposure process, i.e., with an opening of shutter 6, reversing motor 9 is simultaneously set into rotation via electronic control 8, so that rack 11 will be moved in the direction of arrow 12 until image 16 of width mark 3 stands over slit 20 and is thereby in alignment with photoelectric transducer 21. The pulse that is thereby developed cuts out reversing motor 9 via electronic control 8.

The rotation of gear 10 for movement of rack 11 in the direction of arrow 12 occurs by means of a de-energized coupling 23, whereby this connection — in the present case a magnetic coupling — is only changed to the energized state if both the storage of the width value by analog displacement of rack 11 in the described manner and the exposure process for photolayer support 7 with the symbol 2 in question, has been completed. At this moment, via electronic control 8, not only is coupling 23 energized but also reversing motor 9 is set into rotation in the opposite direction, so that now rack 11 moves back in the direction of arrow 24. Since this process occurs with a connected sprocket roll 25, the width stored by the analog translation of rack 11 is transferred to photolayer support 7, i.e., the latter is advanced by exactly this width and positioned so that it can be held for receiving the next symbol 2. During the width shift of photolayer support 7, the releasable character support 1, immediately after the conclusion of the illumination of the foregoing character or symbol 2 with simultaneous storage of its width value, can be set by the operator of the photocomposing machine to the next symbol 2.

The return of rack 11 in the direction of arrow 24 and therewith the resetting of pivoting mirror 14 to the starting position, continues until rack 11 reaches an end stop 22 and closes an end switch 26, whereby via electronic control 8 reversing motor 9 is cut off and coupling 23 is de-energized.

The photocomposing machine as set forth in the present example for one character size for the sake of simplicity can, of course, be used with suitable means for all character sizes.

Since, in hand-operated photocomposing machines, both the exposure time and the duration of the width shift, and the selection of a character by the operator require approximately equal amounts of time, in a photocomposing machine of the present type with intermediate storage for the width, by temporal parallel running of exposure and width value storage on the one and, width shift and character selection on the other, the setting speed can be increased by approximately one third.

Obviously, many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims, the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. Device for the photographic composition of characters with random widths that are not divisible into sub-units, which are determined by control marks on a character support associated with said characters, and which control marks control advance of a film by means of a sensing device, before said character support is subsequently released and the next character can be brought into a projection position, characterized in that a pivoting mirror is disposed in the beam path of an optical sensor for a width mark, a reversing motor operatively connected with said mirror for pivoting same, an electronic control means operatively connected with said reversing motor for actuating same in a given direction simultaneously with the illumination of a symbol, said mirror being connected via toothed gears with a rack, one of said gears being directly coupled with said reversing motor and being connectable via a coupling means to an element for the width shift of a photolayer support upon reversal of the rotation of said reversing motor, after the width value of the symbol to be set-in has been stored by opposed analog linear movement of said rack and the illumination of the said symbol is completed.

2. Device as in claim 1, characterized in that the actuation of said reversing motor which is simultaneous with the illumination of said symbol and therewith the displacement of said rack, is stopped via a photoelectric transducer after the image of said width mark deflected by said pivoting mirror has been aligned therewith, and in that the movement of said reversing motor for the width shift in the reverse direction is interrupted by an end switch.

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