

Nov. 22, 1966

M. FRIEDEL

3,286,608

PHOTOGRAPHIC-TYPE PRINTING DEVICE

Filed May 20, 1964

3 Sheets-Sheet 1

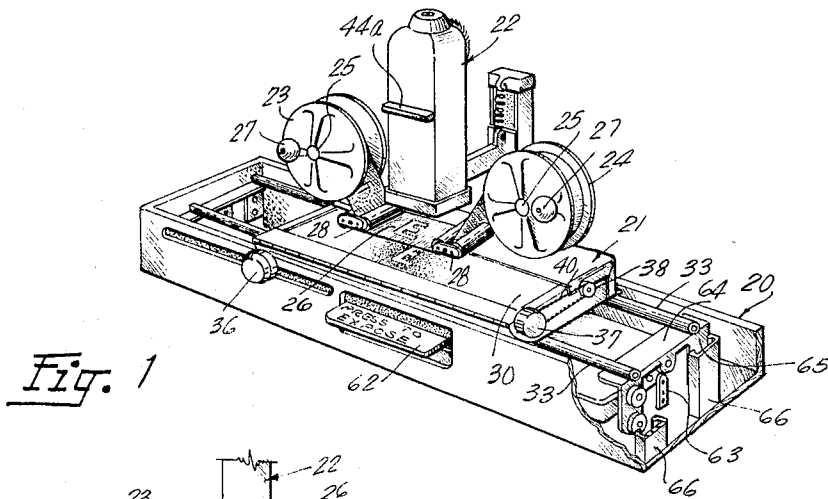


Fig. 1

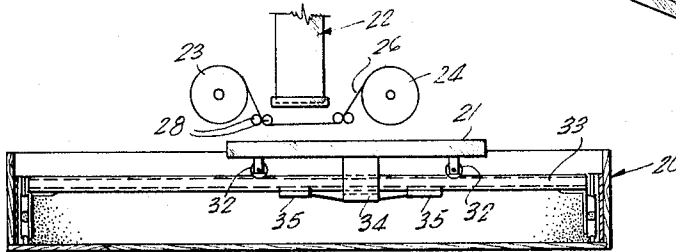


Fig. 2

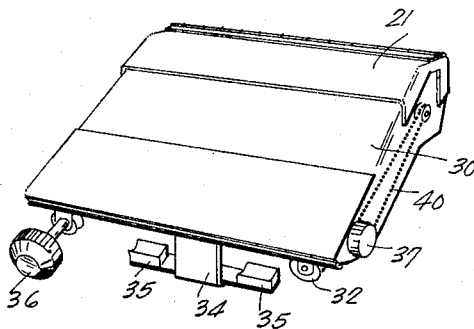


Fig. 3

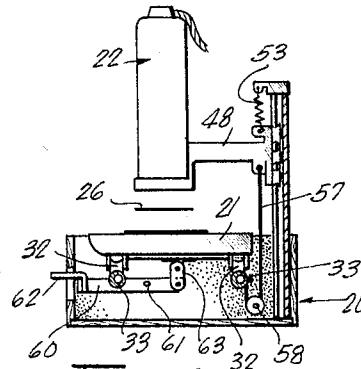


Fig. 4

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3 Sheets-Sheet 2

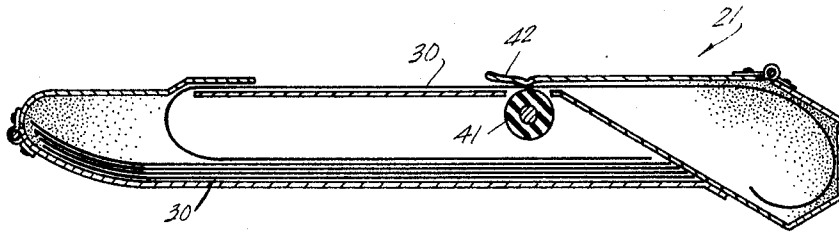


Fig. 5

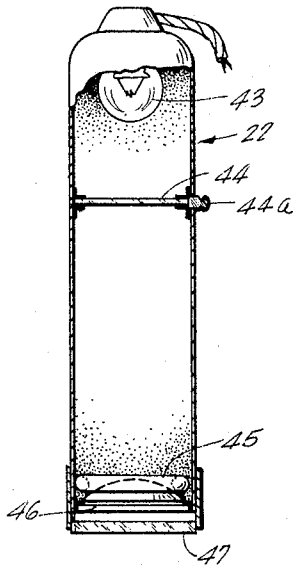


Fig. 6

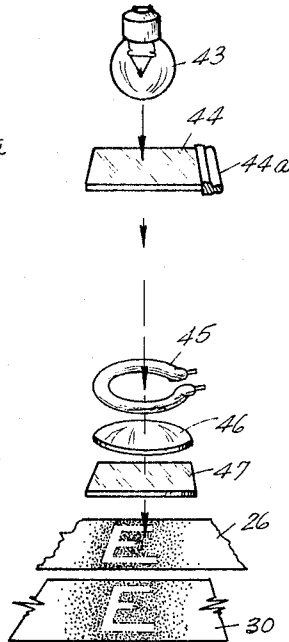


Fig. 7

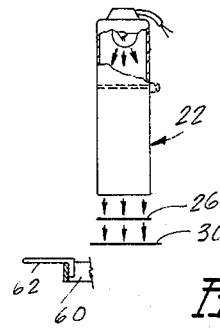


Fig. 8

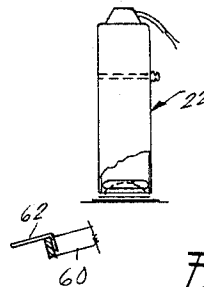


Fig. 9

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PHOTOGRAPHIC-TYPE PRINTING DEVICE

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3 Sheets-Sheet 3

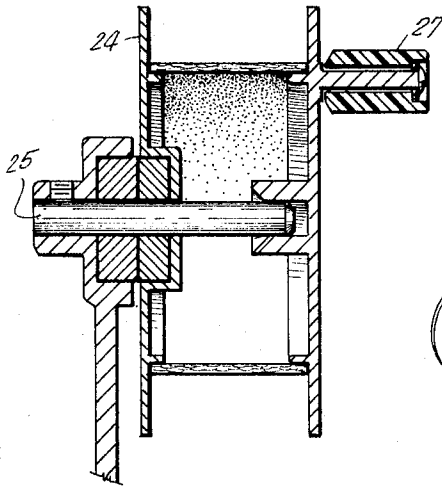


Fig. 10

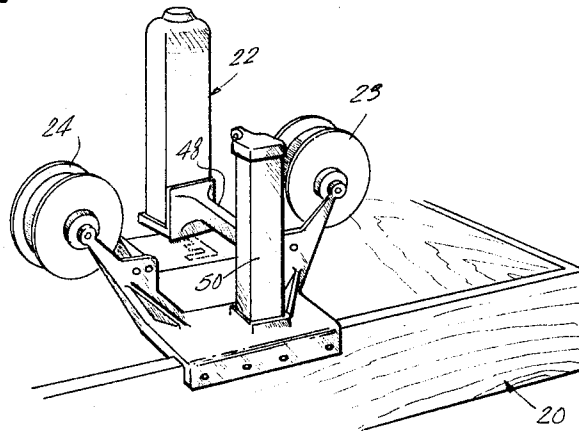


Fig. 11

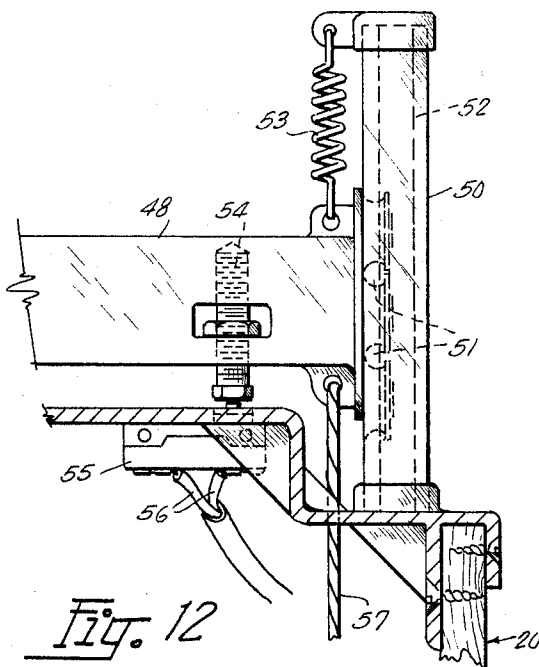


Fig. 12

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3,286,608

PHOTOGRAPHIC-TYPE PRINTING DEVICE

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10 Claims. (Cl. 95-4.5)

This invention relates to a photographic type printing device for printing a plurality of selected type characters onto a light sensitive sheet. The invention has particular reference to a printing operation and method which photographically records a collection of characters without the use of expensive lens systems.

Type printing arrangements for photographic compositions are old in the art and vary considerably in complexity and design. Most of these devices use lens systems for focussing the image of a type character onto a sensitized sheet which is later developed to produce a composite type arrangement. It is often difficult to adjust the type characters so that the spacing between letters and the spacing between lines is correctly proportioned. This is especially true when the exposure produces no immediate image. The present invention uses a sensitized paper sheet which produces a faint printing-out image as soon as a proper exposure has been made. This image is sufficient to permit an operator to make adjustments in spacing and thereby provide a pleasing composition. The light sensitive sheet is later developed in the usual manner to produce a contrasty black and white composition which may then be used to form a matrix for an offset printing machine.

One of the objects of this invention is to provide an improved photographic type printing device which avoids one or more of the disadvantages and limitations of prior art printing devices.

Another object of the present invention is to compose a desired succession of characters on a printing-out sheet which can be used later to print a large number of copies.

Another object of the present invention is to increase the speed of composing a line of characters.

Another object of the present invention is to provide a device in which the characters being printed can be observed as the operation continues, thereby eliminating the chance of mistakes.

Another object of the present invention is to provide a photographic composing device which does not require expensive lenses for focussing the image of a character onto a printing surface.

A feature of the present invention is the use of contact printing from a font roll of characters onto a light sensitive printing surface.

Another feature of the present invention includes the use of a printing-out paper whereby characters can be seen on the paper as soon as the exposure has been made.

Another feature of the present invention includes a detachable font roll of characters on storage spools and a removable cassette containing the light sensitive printing papers. The invention comprises a photographic type printing device which includes a printing section within an enclosure, a character strip positioned below the printing section, and an adjustable cassette positioned below the character strip. The cassette carries a light sensitive sheet arranged for exposure and a lamp in the printing section provides illumination for first adjusting the character strip and the light sensitive sheet, and also for exposing the sheet through transparent portions of the strip. A removable light filter is positioned in the printing section for passing nonactinic light when the sensitive sheet is being adjusted. The printing section may be raised at the same time the cassette is lowered

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for making proper adjustments, then the printing section is lowered and the cassette is raised for exposure of the sheet while in contact with the strip.

The invention consists of the construction, combination and arrangement of parts, as herein illustrated, described, and claimed.

In the accompanying drawings, forming a part hereof, is illustrated one form of embodiment of the invention in which drawings similar reference characters designate corresponding parts and in which:

FIGURE 1 is an isometric view of the printing device with parts of the base in section.

FIGURE 2 is a front view of the device with some parts shown in section.

FIGURE 3 is a perspective view of the cassette which holds the light sensitive sheet.

FIGURE 4 is an end view, partly in section, of the device illustrating the mechanism which raises and lowers the printing section.

FIGURE 5 is a cross sectional view of the cassette showing a plurality of light sensitive sheets within the cassette and one sheet in printing position.

FIGURE 6 is a cross sectional view of the printing section showing two lamps and a light filter.

FIGURE 7 is an exploded view of the printing components positioned within the printing section.

FIGURE 8 is a side view of positions of the device showing the relative positions of the printing section, the character strip, and the light sensitive sheet while adjustments are being made.

FIGURE 9 is a side view similar to FIGURE 8 but showing the components in contact position while exposure is being made.

FIGURE 10 is a cross sectional view of one of the spools used for storing the character strip.

FIGURE 11 is a rear view, in perspective showing the printing section, the storage spools, and one of the characters in its adjusted position.

FIGURE 12 is a cross sectional view showing the mounting of the printing section and illustrating the means within which it may be raised and lowered.

Referring now to the drawings and particularly to FIGURES 1, 2, 3, and 4, the type printing device includes a box-like base 20, an adjustable cassette 21, and a printing section 22. A pair of storage spools 23 and 24 are mounted on shafts 25 for carrying a character strip 26 which contains a plurality of transparent character forms. These characters may be letters, figures, or punctuation marks or any other characters which may be used to form a composition for printing. As shown in FIGURES 1 and 2, character strip 26 may be adjusted in position by turning either one of the spools 23 or 24 by means of handles 27. Strip 26 passes through two pairs of guide rollers 28 in order to present a flat printing portion directly under the printing section 22.

The cassette 21 is shown in FIGURES 3 and 5, and forms an adjustable mount for one or more sheets of light sensitive printing paper 30. The cassette is mounted on four rollers 32 which roll on two guide bars 33. The cassette is resiliently held in contact with the bars by a bracket 34 and two spring pads 35. It is obvious from this arrangement that the cassette may be moved in a lateral direction so that any part of the printing surface may be positioned under the printing section. In order to facilitate this lateral movement and make the adjustment more accurate, a control knob 36 is provided for manual operation. A second control knob 37 (see FIGURE 1) is mounted above the forward rail 33 in easy reach of the operator. This knob is coupled to a roller 38 by means of a chain 40 for moving the light sensitive sheet transversely so that more than one

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line may be exposed onto sheet 30. Roller 38 is directly coupled to a contact roller 41 (see FIGURE 5) and this roller is resiliently urged against the underside of sheet 30 to move it as above described. Roller 41 is preferably made of rubber for friction contact with sheet 30. On the top side of the sheet a Teflon coated spring 42 holds sheet 30 in sliding contact. As shown on FIGURE 5, cassette 21 not only holds the light sensitive sheets 30 in position while being exposed but it also acts as a storage space for a number of other exposed or unexposed sheets 30. The light sensitive sheets are provided with a silver emulsion having the property of producing a faint but visible image on exposure to light. Such sheets are known and do not form part of this invention.

The printing section as shown in FIGURES 6 and 7, includes a first lamp 43 mounted at the top of the enclosure. A short distance away a filter 44 is mounted for absorbing the actinic portion of the light produced by lamp 43. This filter is designed to pass only the nonactinic light rays, such as red and yellow, so that during the preliminary adjustment step the image of the character on the strip 26 may be projected against the surface of the printing sheet 30 without causing any exposure.

Lamp 43 is primarily used for illuminating the photo-sensitive sheet 30 with nonactinic light so that a proper adjustment can be made for spacing the characters. This same lamp may be used to expose sheet 30 although this is not the preferred method of operation. When no other source of illumination is available, lamp 43 is provided with additional current and its illumination exposes the sheet after filter 44 has been withdrawn by use of its handle 44A. When an additional source of illumination is used, an intense flash lamp 45 may be employed. This lamp may be circular as shown in FIGURE 7 and may be gas filled. This type of lamp is substantially ring shaped and similar to that which is sometimes used as an electronic flash unit in connection with high speed cameras.

The first step in forming a plurality of latent images is to separate the printing section from the character strip 26 and the printing sheet 30. Lamp 43 is lighted and its rays are collimated by lens 46 having a focal length equal to the distance of separation between the lens and the filament of lamp 43. The filament in lamp 43 is small and acts as a point source, thereby producing parallel light rays after the passage through lens 46. The bottom of the printing section is covered by a pressure plate 47 of glass which presses against the character strip 26 and sheet 30 during exposure. The flash lamp 45 may be positioned anywhere within the printing section since no focusing action is necessary during the contact exposure operation.

From the above description it will be obvious that the printing section 22 must be raised above the character strip and at the same time the exposure sheet 30 must be lowered to provide observation for adjustment and alignment. Such an arrangement is shown in FIGURE 8. After the character strip and the printing sheet have been properly adjusted, the three components are moved into contact position for the printing operation. This arrangement is shown in FIGURE 9. There are many mechanical arrangements which may be used to open and close these components. One of these arrangements is shown in FIGURE 12 where a support arm 48 holds the printing section and is adjustably mounted on a vertical track arrangement 50. Appropriate rollers 51 are provided to make contact with a track system 52 and a helical spring 53 is provided for supporting the printing section 22 and support arm 48. An adjustable stop bolt 54 may be provided as a limited means and this bolt may be used for actuating an enclosed electrical switch 55 which connects two conductors 56 which lead to a source of electric power and the flash lamp which

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exposes the light sensitive sheet 30. Support arm 48 is controlled by a cable 57 which is secured to a portion of the mechanism which supports cassette 21. The cable is in contact with a pulley 58 (see FIGURE 4) so that when the cassette 21 is moved upwardly, the printing section 22 is moved in a downward direction to clamp the character strip 26 between them.

Cassette 21 may be moved in a vertical direction by any convenient mechanical means, the one shown in FIGURE 4 being only one example of such a control. In this figure a manual lever 60 is pivoted at point 61 and includes a handle 62 and a coupling link 63. The other end of the coupling link is secured to the bottom portion of cassette 21. As seen in FIGURE 1, a bracket 64 supports rods 33 and the cassette 21, and this bracket is formed with two downwardly extending arms 65 which slide in channels 66. These channels maintain the rods 33 and cassette 21 in a horizontal position during their vertical movement.

The operation of this device is obvious from the above description: With filter 44 in place and lamp 43 lighted, the printing section and the cassette are separated and the image produced by one of the transparent characters in strip 30 is adjusted for spacing and positioning. Then handle 62 is depressed, thereby raising the cassette and lowering the printing section and at the same time closing switch 55 and activating flash lamp 45 to print a character on the tape. The emulsion on sheet 30 is arranged so that it will provide a printing-out image immediately without development. This image is faint but it shows the position of the character and aids in spacing the next succeeding character. After a line of characters has been printed, knob 37 is turned and sheet 30 is moved away from the operator and a new line space is provided.

After the printing operation has been completed the light sensitive sheet 30 is developed to give a contrasting black and white image. It has been found that the degree of latent image overexposure (the ratio of develop-out speed to print-out speed) depends upon the nature of the photographic emulsion. Unfortunately, the emulsions best suited for use in the graphic arts are frequently unbalanced for the present use, in that they tend to overexpose the latent image when sufficiently exposed to give a visible print-out image. In the preferred embodiment of the present invention this tendency of the latent image to become greatly overexposed is eliminated by adding to the first developer, large quantities of a restrainer such as potassium bromide, benzotriazole and/or other restrainers well known in the photographic art.

A specific developer suitable for use in the present invention and in conjunction with the typical extra hard paper best suited for use in the graphic arts is as follows: 4.5 grains Hydroquinone, 1 gram Metol, 20 grams sodium sulphite, 30 grams sodium carbonate, 10 grams potassium bromide and 5 grams benzotriazole. The above is dissolved in one liter of water. Following development, the processing of the light sensitive sheet is completed by conventional solutions such as a short stop, fixative and washing or processing to complete the stabilization.

A specific and preferred filter 44 for use in the present invention is cobalt glass or a filter material containing solutions of cobalt salts. It has been found that such filters provide stronger print-out images and weaker develop-out images which greatly improves the overall operation of the present device.

Having thus fully described the invention, what is claimed as new and desired to be secured by Letters Patent of the United States is:

1. A photographic type printing device comprising, a printing section within an enclosure, a character strip positioned below the printing section, an adjustable cassette positioned a distance below the character strip

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so that an image of a character may be viewed prior to a printing operation, at least one light sensitive sheet carried within the cassette, said printing section including a lamp for providing illumination to aid in adjusting the respective positions of the character strip and the light sensitive sheet, said printing section also including a collimating lens for producing parallel light rays which pass through transparent portions of the character strip and cast an image thereof on the sensitive sheet, a removable light filter also in the printing section for passing nonactinic light when the sensitive sheet is being adjusted, a manually adjustable means for raising and lowering the printing section, said means also mechanically coupled to the cassette to lower and raise the sensitive sheet for separating the character strip and the sensitive sheet for observation and for bringing the strip and sheet into contact when a printing operation is to be performed, and electric circuit means for activating said lamp only when the character strip is in contact with the light sensitive sheet.

2. A type printing device as claimed in claim 1 wherein a second lamp is positioned in the printing section between the light filter and the character strip for exposing the sensitive sheet during an exposure operation.

3. A type printing device as claimed in claim 2 wherein said electric circuit means includes a switch connected in series with a source of electric power and said second lamp, said switch positioned on the manually adjustable means and operated each time the strip and sheet are moved into contact position.

4. A type printing device as claimed in claim 2 wherein said cassette is mounted on rollers and is manually adjustable along a line parallel to the line of motion of the character strip.

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5. A type printing device as claimed in claim 2 wherein the light sensitive sheet in the cassette is manually movable by means of a friction roller in a direction at right angles to the line of motion of the cassette.

6. A type printing device as claimed in claim 2 wherein said character strip is mounted on two storage spools and is manually movable by turning said spools.

7. A type printing device as claimed in claim 2 wherein said cassette is mounted on vertical guide rods for maintaining the printing surface of said sheet in a horizontal plane during its vertical movement.

8. A type printing device as claimed in claim 2 wherein said cassette contains a storage space for exposed and unexposed light sensitive sheets.

9. A type printing device as claimed in claim 2 wherein said second lamp is formed in the shape of a circle and is mounted within the printing section so as not to obstruct the light from the first lamp.

10. A type printing device according to claim 1 in which the light filter is a cobalt glass.

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