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(54) A photographic printing device

(57) In a housing 11 a dark chamber 18 communicates in light-tight manner with a projector 27. The dark chamber 18 has an image window 20 over which may be disposed a self developing instant film pack holder 16 and onto which a rigidly-mounted mirror 55 reflects all the light coming from the projector 27. The projector 27 has a flash-bulb, 28 attuned to daylight film pack, and emitting a constant amount of light per flash.

Connected subsequent to the flash bulb 28 in the light path are an opalescing plate 34 to reduce contrast and a transparency holder 40 as well as a rigid non-adjustable but shutter-regulatable objective 46 which opens into the dark chamber 18. Means are provided in order to trigger one flash in each case for exposing a print the exposure being varied if necessary by the shutter. Apart from the shutter nothing has to be adjusted, which makes the device foolproof for amateurs.

The drawings originally filed were informal and the print here reproduced is taken from a later filed formal copy.

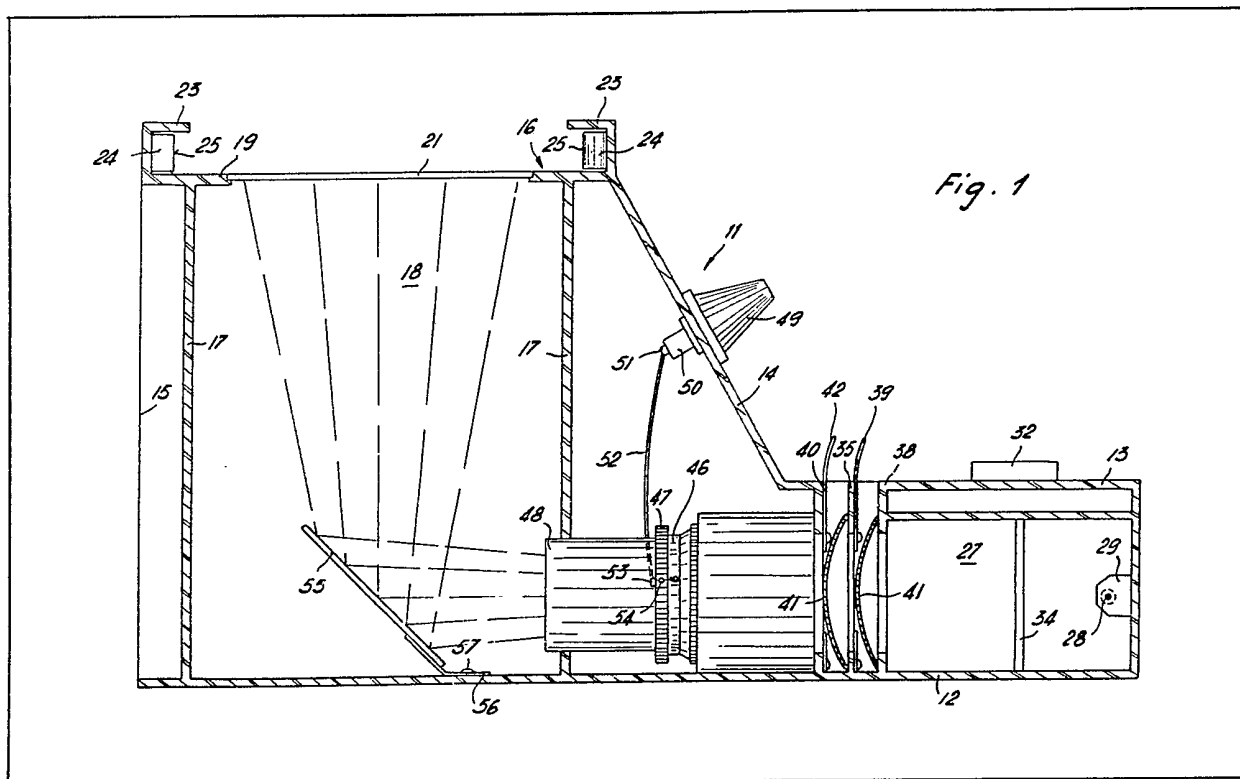


Fig. 1

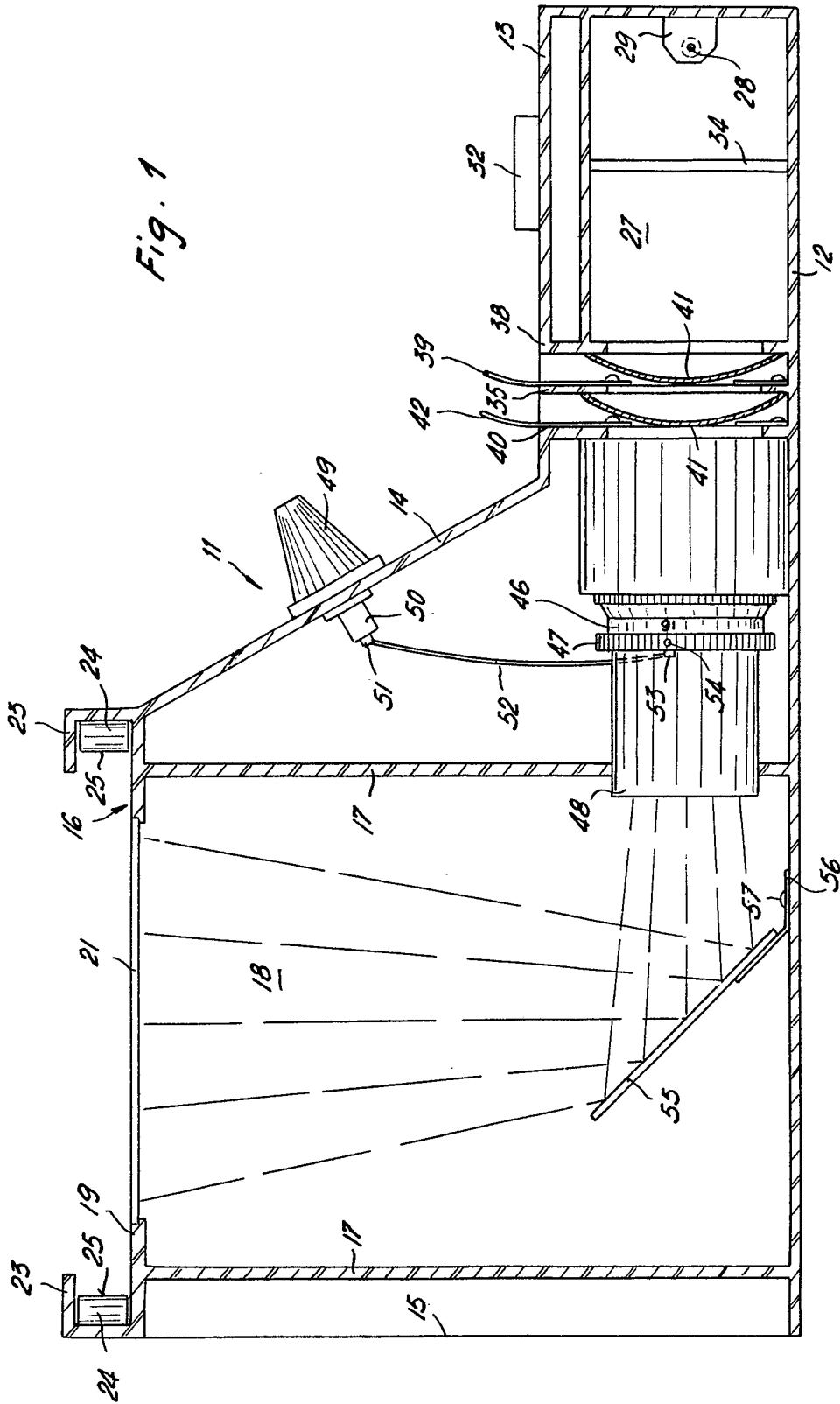


Fig. 2

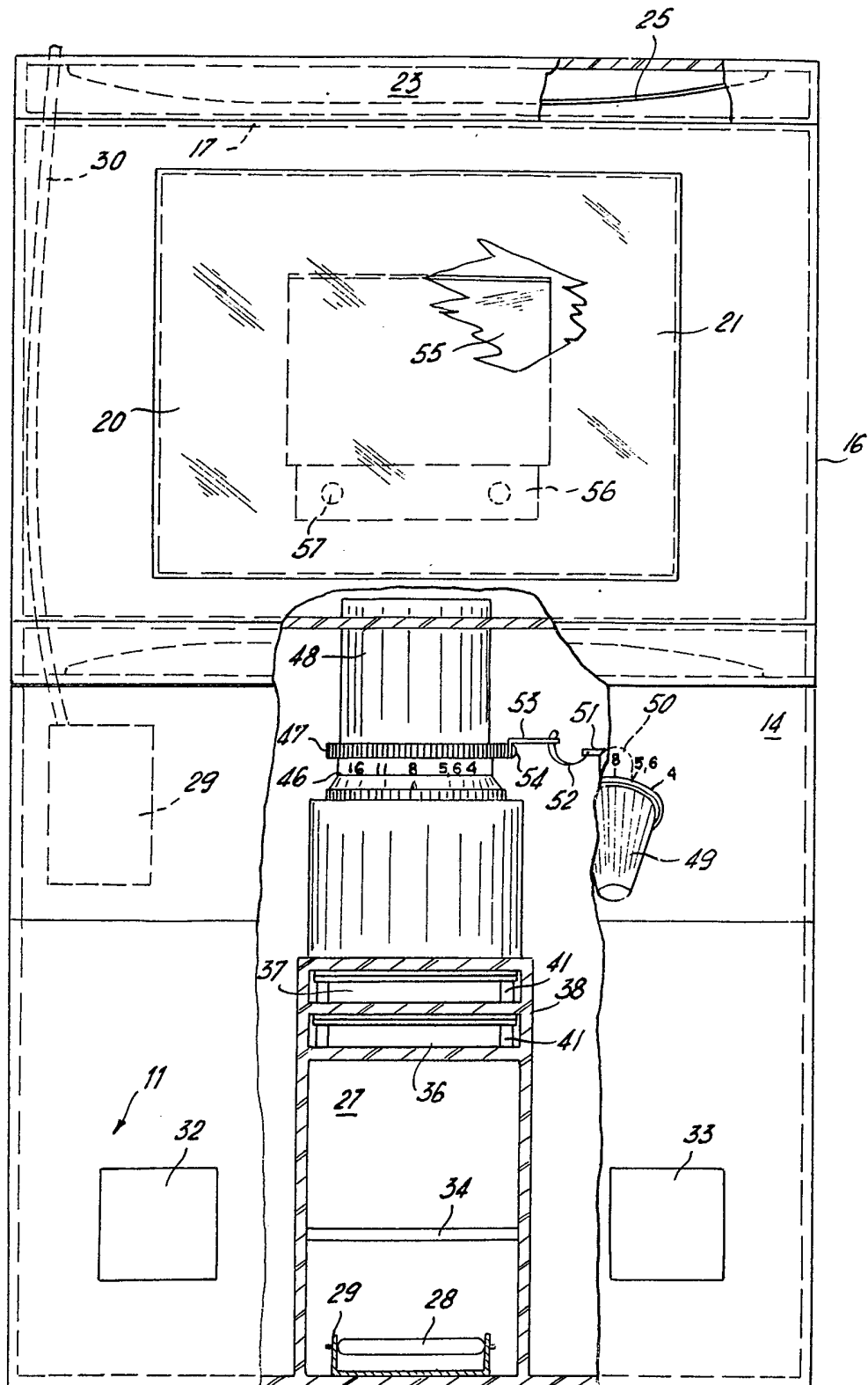


Fig. 3

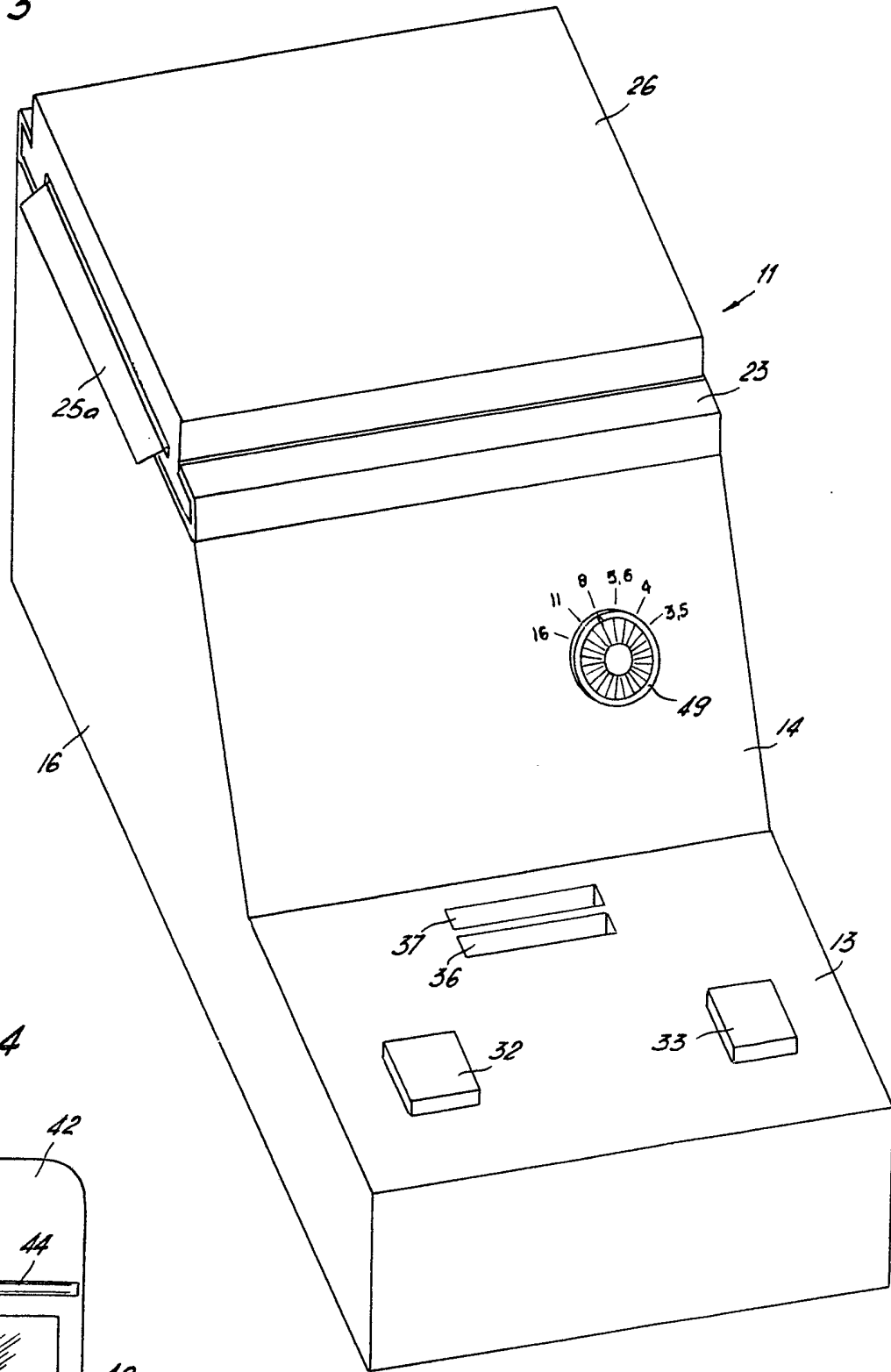
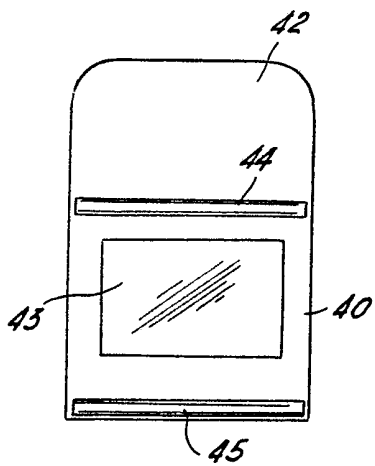


Fig. 4



SPECIFICATION

A photographic printing device

This invention relates to a device for producing photographic prints, such as copies and enlargements, from transparencies, for example, diapositives (or slides) and negatives, preferably using self-developing instant film packs as a printing medium.

A number of devices are known for producing photographic prints from black-and-white negatives and from diapositives. For example, described in Swiss Patent No. 598,614 is a diapositive printer which has a housing, provided on the front plate of which is, a rectangular opening elevated at the front. A ground glass plate covers this opening, and fitted thereover is a film pack. Arranged under the glass plate is a dark compartment which contains an inclined mirror and an objective. Provided on the outside of the housing are knobs for adjusting the shutter and for sharp or enlargement adjustment of the objective. The housing is also provided with a further compartment which contains a quartz lamp and two reflecting mirrors. A third mirror is arranged laterally of the quartz lamp in an inclined manner, in order to reflect light to the objective. A diffuser, a filter and a diapositive are releasably arranged in a respective holder, between the third mirror and the objective so as to be in the path of light from the lamp.

A disadvantage of the aforementioned device is that the quartz lamp is not adapted to the Kelvin grading of the instant developing film contained in the film pack. A grading of approximately 5400 Kelvin is applicable for commercially-available daylight films. On the other hand, quartz lamps have a grading of about 3400 Kelvin, so that filters are necessary in this device in order to adapt the Kelvin gradings to one another. Furthermore, quartz lamps produce a considerable amount of heat and need fairly long exposure times, which can lead to deformation and/or deterioration of the transparency.

Described in United States Patent No. 3,065,667 is apparatus for producing enlarged prints from transparencies or diapositives.

This apparatus has a light-tight housing which has on an upper part thereof a processing head which may be a self-developing Polaroid camera, the film portion of which is turned to the interior of said housing. The diapositive is arranged thereunder in a holder in front of a time-controlled flash unit. Arranged between the diapositive and the film is an objective having a shutter or diaphragm by which an enlarged image can be projected onto the film. For amateur photographers this device and other similar known printing devices, are too expensive and have a too complex construction.

Further such devices are described, for example in United States Patents Nos. 4,076,413; 3,689,148; 3,454,943; 3,697,175 and 3,653,760.

An object of the present invention is the

provision of a printing device which is especially suitable for amateurs and which is foolproof, simple and economical to produce and operate.

With this object in view the present invention provides a device for producing photographic prints on a printing medium, starting from a transparency, comprising a housing having a dark chamber, a projector communicating therewith in light-tight manner, an image window associated with said dark chamber and being provided with retaining means for the printing medium, a mirror, fastened rigidly in the dark chamber for reflecting an image, produced by the projector, in the direction of the image window, in which respect the projector has a light source operable in a time controlled manner, an objective, opening into the dark chamber and having a shutter, adjustable from the outside of the housing, and retaining means for the transparency present between the light source and the objective in the light path, characterised in that the projector is equipped with a flash bulb or tube which emits an equal amount of light per flash, an opalescing light-transmissive plate being arranged between the flash bulb transparency retaining means and the rigidly-mounted shutter-adjustable objective in which respect the mirror reflects to the image window practically all of the light arriving at it from the projector.

The device in accordance with the invention thus has an effective and simple construction, and it does not contain a large number of light-reflecting mirrors or objective adjusting or exposure means. It has a flash bulb or tube which emits an equal intensity of light per flash with a Kelvin grading which is adapted to the daylight grading of the instant developing film.

Advantageously, in order to mitigate contrast, the opalescing light-transmissive plate made, for example, from glass or plexiglass, is provided between the flash bulb or tube and the film pack in the path of light from the flash bulb. Without this plate, the contrast would be too strong. The plate brings about a softer image on the instant film.

The device of the invention is particularly suitable for producing photographic prints on a printing medium in the form of a self-developing film pack, but one can also use other printing media in order to produce both coloured and black-and-white prints.

The device has a housing which is very simple. A holder for an instant film pack can simply and easily be provided, in which respect the film pack can rest on a flat surface which is adjacent the image window of the dark chamber. The image window is preferably covered with a ground glass plate. Means for restraining the film pack may be fastened to the holder. The said means may have L-shaped members. The L-shaped members may extend upwardly from surface-limiting guide channels through which the side edges of the pack are inserted. Present in the channels there may be spring means for holding the pack at its location in the holder. The lower part of the holder may have a box-like portion which is provided with walls

which extend into the dark chamber, in order to form a light-tight compartment. The latter may then be of a light-absorbing material or be covered therewith.

5 In the dark chamber the mirror may be rigidly fastened at an angle of about 45° with respect to the objective's axis. Advantageously, connected adjacent to the dark chamber is an elongate housing which forms a housing for the projector.
10 The projector contains the flash bulb, the opalescing plate arranged in the objective direction in front of the flash bulb or tube, the diapositive and filter chamber arranged in the objective direction in front of this opalescing plate,
15 in order to insert a diapositive transparency and filter, as well as the objective. The objective leads into the dark chamber. This objective is rigid and non-adjustable and has preferably a focal length of 50 mm. It has a ring for adjusting the shutter opening,
20 in order to influence the exposure of the image on the film pack. The ring is connected by coupling means to a knob in the intermediate portion of the housing, in order to be able to remote-operate the shutter.

25 The device can be electrically operated by means of a mains connection supplying, for example, a voltage of between 110 and 250 volts or by means of a battery. Connected prior to the flash bulb or tube is an impulse generator which is
30 actuated by means of a trigger knob or button arranged on the housing. The flash bulb or tube is so constructed that each flash supplies the same amount of light. Therefore only the shutter needs to be operated to determine the exposure.

35 The invention will be described further, by way of example, with reference to the accompanying drawings, in which:

Fig. 1 is a part-sectional side view of a preferred embodiment of the device of the invention;

40 Fig. 2 is a part-sectional plan view of the device of Fig. 1;

Fig. 3 is a perspective view of the device of Figs. 1 and 2 comprising an instant film pack; and

45 Fig. 4 is a front elevation of a holder for a diapositive or a filter suitable for use with the device of Figs. 1 to 3.

The printing device of the invention and the preferred embodiment thereof illustrated in Figs. 1 to 3 is suitable for producing coloured or black-and-white prints on a printing medium from
50 photographic transparencies such as diapositives. It is also suitable both for producing coloured diapositives from, for example, instant developing film pack and black-and-white prints on
55 conventional photographic printing paper from black-and-white negatives. In addition it can also be used to produce negatives.

Referring to Figs. 1 to 3 the illustrated embodiment of the printing device of the invention
60 comprises a hollow housing 11 which consists of a base portion 12, a front portion 13 and intermediate portion 14, extending upwardly at approximately 45° to the base portion 12, and a rear portion 15. Provided above the rear portion
65 15 is a holder 16 for an instant developing colour

film pack, for example one which is manufactured by the Polaroid Corporation or Eastman Kodak Company. Such film packs are used in self-developing film cameras the film generally having
70 a daylight grading of approximately 5400 Kelvin. The base portion 12 has extending therefrom adjacent the rear 15 of the housing 11 two walls 17, the base portion 12 and walls 17 being made of a light absorbing material and forming a box-like dark chamber 18. Alternatively the base
75 portion 12 and walls 17 can be made of another material and covered with a light-absorbing material. Surface 19 of the holder 16 has a flat metal plate with a rectangular image opening 20 adapted to the dimensions of the self-developing
80 film pack. The image opening 20 is covered by a sheet glass 21. Above the surface 19 of the holder 16 on opposite sides thereof there extend a pair of L-shaped component parts 23 which form guide
85 channels 24 into which the ends of the film pack are inserted. Two flat band springs 25 are connected by their respective ends to a respective L-shaped component part 23, in order to hold the film pack in the holder 16 after its insertion. Fig. 3
90 shows a film pack 26 located in the holder 16.

From the front portion 13 as far as the intermediate portion 14 of the housing 11 there extends an elongate box-like housing which contains a projector 27. Fastened to the front end
95 of this projector 27 is a flash bulb or tube 28 which is held in a socket 29. This flash tube 28 is, for example, fastened horizontally in the projector 27, in order to supply a uniform illumination over the entire transparency. The flash tube 28 is
100 connected by suitable wiring (not shown) to an impulse generator 59, which is fed by means of leads 30 from an external voltage. The energy source for the printer can be, for example, 110V or 220V—250V alternating current using a means
105 connecting socket or a battery (not shown). A main switch 32 is present for this purpose in order to switch the energy on and off. On the other hand, a flash triggering button 33 is used to feed an electronic impulse to the flash tube 28 from the
110 impulse generator 59.

The mode of construction of flash circuits is well-known and is not described here. Disposed in the light path of the flash tube 28 is an opalescing plate 34, made of glass or plexiglass, the purpose
115 of which is to lower the contrast of the image projected onto the film pack 26. A filter holder and diapositive holder subassembly 35 is arranged in the light path in front of the opalescing plate 34 and has a filter chamber 36 and a diapositive
120 chamber 37, which extend vertically from the base portion 12 and open through the surface of the front portion 13, in order to allow access to each chamber 36, 37 through the surface of the front portion 13. The chambers 36, 37 are connected
125 together at two opposite sides by means of two elongate E-shaped component parts 38. Into the chambers 36 and 37 fits a filter holder 39 or a diapositive holder 40 respectively, that is along channels formed by the E-shaped parts 38.
130 Arranged against the front inner wall of each E-

shaped component part is a respective leaf spring 41, in order to hold the dispositive and the filter in their associated channels. In each holder 39, 40 a tongue 42 allows a user of the device to insert or remove each holder 39, 40 through the front portion 13.

Fig. 4 is a front view of a diapositive holder 40, which is identical to the filter holder 39. The holder 40 has a rectangular opening 43 which is equal in size to the size of the image on the diapositive. An upper strip 44 and a lower strip 45 are formed above and below the opening 43, in order to engage between them the cardboard frame of a diapositive or another transparency.

Fastened at the front end of the projector 27 (Figs. 1 and 2) is a subassembly 46 for a 50 mm lens, and it has a shutter adjustment ring 47 for the adjustment of the shutter. A light-tight tube or viewing hood 48 passes over the lens subassembly 46 and extends into the dark chamber 18 through an opening in one wall 17 of the housing 11.

A knob 49 for the adjustment of the shutter is arranged on the surface of the intermediate portion 14. An extension 50 of the knob 49 projects from an inner face of the intermediate portion 14 and has a pin 51 which is provided with an opening and which is fastened by means of the opening at a right angle to the knob 49. One end of a connecting wire 52 is connected to the pin 51 at the opening thereof, whereas the other end is connected to a pin 53 which is provided with an opening and which is fastened to the ring 47 by means of a clamp 54. The movement of the knob 49 in the clockwise direction or anticlockwise direction brings about, by means of the connecting wire 52, a corresponding movement of the shutter adjustment ring 47, so that an accurate adjustment of the shutter from outside the device is possible, in order to control the brightness of the print.

A mirror 55 is fastened to the base portion 12 of the housing 11 by means of clamps and fastening screws 57. The mirror 55 is disposed at approximately 45° from the base portion 12 and thus with the objective's axis and brings about the projection of an image from the optical system onto the film pack.

The operation of the printing device of the invention is as follows: An instant developing film pack 26 is first of all inserted into the holder 16, as shown by Fig. 3. Voltage is then supplied to the printer by pressing on the main switch 32. The knob 49 for the adjustment of the lens aperture is set. For normally exposed diapositives the shutter aperture setting is 11. After the insertion of a diapositive in its holder 40, the holder 40 is inserted into the diapositive chamber 37. In order to expose the instant developing film in the film pack 26, a safety lid on the right-hand side of the film pack and a flexible slider on the left-hand side of the film pack 26 have to be removed. The flash triggering button 33 then pressed, in order to effect exposure of the film in the film pack 26.

Now a white tongue 25a on the film pack can be

drawn outwardly, whereby a yellow tongue (not shown) is released. The yellow tongue is also drawn out, and the user must wait a certain length of time until the film has developed. To gauge this length of time accurately an electric time meter can be provided. After the development time has elapsed the print is separated from the negative, as is indicated by the instructions on the film pack. Optionally a black-and-white negative can be inserted into the diapositive holder 40 instead of a colour diapositive, and conventional photographic printing paper can replace the film pack, in order to produce a standard black-and-white print.

The flash tube arrangement of the invention affords an adaptation to the Kelvin requirements of the instant developing film (about 5400°K). As previously mentioned, in order to mitigate an undesirably high contrast of the print after the exposure the opalescing plate is used and this gives a softer print which has a uniform colour hue. In order to allow the operator to vary the colours or shades on the print if desired, filters can be used but not to vary the Kelvin grading, as is necessary in accordance with Swiss Patent No. 598,614. Without filtering the device of the present invention prints exactly what is present on the diapositive.

CLAIMS

1. A device for producing photographic prints on a printing medium, starting from a transparency, comprising a housing having a dark chamber, a projector communicating therewith in light-tight manner, an image window associated with said dark chamber and being provided with retaining means for the printing medium, a mirror, fastened rigidly in the dark chamber, for reflecting an image, produced by the projector, in the direction of the image window, in which respect the projector has a light source operable in a time controlled manner, an objective, opening into the dark chamber and having a shutter, adjustable from the outside of the housing, and retaining means for the transparency present between the light source and the objective in the light path, characterised in that the projector is equipped with a flash bulb or tube which emits an equal amount of light per flash, an opalescing light-transmissive plate being arranged between the flash bulb and transparency retaining means and the rigidly-mounted shutter-adjustable objective in which respect the mirror reflects to the image window practically all of the light arriving at it from the projector.

2. A device as claimed in claim 1, characterised in that the retaining means for the printing medium are stationary.

3. A device as claimed in one of claims 1 to 2, characterised in that retaining means for instant developing photographic material, especially an instant developing film pack, are provided.

4. A device as claimed in claim 3, characterised in that on the dark chamber a holder for an instant film pack has a surface portion on which the film pack rests and has an opening which is aligned

with the printing medium of the film pack which is to be exposed and through which the printing material can be exposed.

5 A device as claimed in one of claims 1 to 4, characterised in that the projector has filter retaining means.

6. A device as claimed in one of claims 1 to 5 characterised in that the mirror is arranged at an angle of 45° to the objective's axis.

10 7. A device as claimed in claim 6, characterised in that the objective's axis is arranged horizontally and the mirror has an inclination of 45° with regard to the horizontal.

15 8. A device as claimed in one of claims 1 to 7, characterised in that the light emission of the flash

bulb is co-ordinated in its Kelvin grading to daylight exposure photographic material, more especially in the order of the magnitude of 5400 Kelvin.

20 9. A device as claimed in one of claims 1 to 8, characterised in that it is a diapositive copier or diapositive enlarger.

25 10. A device as claimed in one of claims 1 to 9, characterised in that it is a negative copier or negative enlarger.

11. A device for producing photographic prints on a printing medium substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.