

SPECIFICATION

Improvements in and relating to the production of copies

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The invention relates to apparatus for producing copies of individual frames of a motion picture film.

There are various possible ways of producing copies of individual frames of a motion picture film.

- 10 Firstly it is known for printing firms to prepare copies of individual frames of a film by the reversal process, the particular frames having been first clearly indicated. However, because it is difficult to mark an individual frame of a film, and in particular to find it
- 15 again quickly, (a film that takes half an hour to project contains about 30 000 individual pictures) for reasons of time and cost that method is used only in exceptional cases. It is in principle also possible to cut the film up and send only the desired frame,
- 20 together with a few adjoining frames, for printing. Because two additional cuts and splices are thereby necessitated, that method is not often used either.

- In addition there are special cameras and, for single-lens reflex cameras, printing sets that are
- 25 commercially available which enable an individual frame of a motion picture film to be printed correspondingly enlarged, onto still film. Reflection prints can be produced from these prints in a further process step. To achieve useful results, a series of
- 30 measures must be applied which excludes the use of this method by the average amateur, since the film and the positive paper require individual processing techniques. Inexpensive reading apparatuses are commercially available in microfilm technology and
- 35 these are quite suitable for use in the home and in small businesses. The currently available re-enlarging devices on the other hand are very expensive.

- It is an aim of the invention to produce a process, and apparatus for carrying out the process, which enable the average ultimate consumer to produce reflection copies of individual pictures from a motion picture film without involving substantial expense.

- The invention provides a projection
- 45 motion-picture viewer having a still picture projection device, comprising a device for accommodating film sheets which can be exposed using the projection ray path, a shutter for determining a reproducible exposure time for the
- 50 same and a pair of squeezing rollers for exposed film sheets which device can be coupled to the drive mechanism of the motion picture viewer.

- Two forms of motion-picture viewer constructed in accordance with the invention will now be described by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a schematic section through the first form of viewer;

- Figure 2* is the same as *Figure 1* except that it shows the projection screen replaced by a copying device;

Figure 3 is a perspective view of the second form of viewer; and

- Figure 4* is a section taken through the viewer shown in *Figure 3*.

Referring to *Figure 1* of the accompanying drawings, for the sake of clarity, all parts known *per se* have been shown in simplified form or have been omitted, for example, the transport device for the film, the rotary disc shutter or rotating prism, the motor and operating controls, fans and similar parts.

- The first form of motion-picture viewer comprises a projection system which consists of a lamp L, a system of condensers 2 with a heat filter 3, a
- 75 projection lens 4, two mirrors 5 and 6 and a back-projection screen 7. Onto the screen 7 a film 8 may be projected as a cine film, or an individual frame may be projected as a still. *Via* appropriate gears (not all shown) a motor 13 drives a rotary disk shutter 14, film-engaging means and a take-up
- 80 spool. Other gears lead *via* a shaft 15, and a pair of bevel wheels 15a to worm 16 in the vicinity of the projection screen 7.

- Figure 2* shows the first form of motion-picture viewer in a state suitable for producing prints. In this state the projection screen 7 shown in *Figure 1* is replaced by a copying attachment which consists of a light-tight housing 9 with an instant picture cassette 18 that is known *per se* inserted in it. A
- 90 shutter 10a serves to uncover the picture window 9a of the cassette 18 for exposure. The shutter may be a hinged shutter or a slit-type (rotary disc) shutter. It is also possible to provide a simple slider member. In addition, the housing 9 contains two developer
- 95 rollers 10 and a gripping mechanism (not shown) which, when exposure is complete, pushes the exposed film between the rollers 10, which in known manner spread developer paste over the surface of the picture and convey the film through a delivery
- 100 slot 11 and out of the housing 9. The rollers 10, the gripping mechanism and the shutter 10a are advantageously arranged to be driven by the drive mechanism of the viewer, and for this purpose an appropriate coupling to the gears of the viewer is
- 105 provided at a suitable place.

In this arrangement, the worm screw 16 drives one of the rollers 10 *via* an appropriate toothed wheel when the instant picture part has been attached.

- To start and stop the motor 16, it is advisable to use the coupling 17, because the motor has to run in order to drive a fan, even when the viewer is not operating. When the instant-picture film has been exposed, the coupling 17 is actuated by means of a mechanical or electrical control facility (not shown)
- 115 that may be actuated by the closure member of the shutter, and thus the worm 16 is turned until the film has been ejected.

- Referring now to *Figures 3* and *4* of the drawings, in the second form of viewer a cassette housing 19 is
- 120 firmly connected to the housing G or is installed therein. A mirror 20 is pivotable between the position in which it is shown in full lines (which will be referred to as the position 20) and a position 20'. When the mirror is in the position 20, the ray path
- 125 from a projection lens 4 is deflected onto a back-projection screen 7; in position 20', on the other hand, it is deflected onto the instant picture film 9a. To an axle on which the rotatable mirror 20 is mounted, which axle may be pivoted by means of a
- 130 button 20a, there is connected a disc 20b to which

there are connected three slider members or pull rods 21, 22 and 23. The slider member 21 leads to the setting lever 24a of a shutter 24. The lever 22 is connected to the lens 4 which may be displaced along its optical axis. Finally, the slider member 23 acts on the hinged shutter 10a in front of the instant picture film.

The method of operation of the second form of viewer is as follows. To produce prints, the pivoting mirror 20 is rotated by the button 20a into the position 20'. A catch (not shown) allows that to take place only when the film is not moving. As this rotation takes place, the disc 20b moves with the mirror 20 and closes the shutter 24 by means of the rod 21. At the same time the rod 23 opens an auxiliary shutter 10a in front of a film cassette 18 in the cassette housing 19 and the slider member 22 displaces the lens 4 through a definite distance in the direction of the arrow 22a. This is necessary because the projection screen 7 is larger than the image area of the instant picture film 9a and the scale of reproduction of the two projections is correspondingly different. The two alternative projection ray paths are therefore necessarily of different lengths, and accordingly, when changing the position of the mirror 20 to change from one projection ray path to the other, it is necessary to move the lens relative to the film 8 in order to re-focus it, which is done with the movement of the slider member 22.

The viewer is now ready for copying. The shutter 24 is opened for the duration of exposure, using a release mechanism, and, after its operation, the auxiliary shutter 10a is closed using suitable control means so that the cassette housing 19 is again sealed off against stray light. At the same time, the developing device, which substantially corresponds to the device in the first form of the viewer is set in operation and the shutter 24 is re-opened for projection.

The required duration of exposure is determined by the sensitivity of the instant picture film and the light flux provided by the viewer. The shutter can therefore be, and advantageously is, set to give an exposure of fixed duration. If the instant picture part is provided as an attachment, as in the first form of viewer which can be used with different projectors, the exposure time may also be adjusted to the particular viewer with which it is being used by means of a control device connected to the coupling mechanism. A manually-operable precision adjusting means for compensating for slight fluctuations in the light flux, for example, after lamps have been changed, may further be provided on the camera.

If, on account of the dichroic mirrors or heat filters used, the colour temperature of the light in the projector differs significantly from that required for the recording material, it is possible to fix the required large area correction filter rigidly in the recording part.

The film transport mechanism may be driven either by hand or by a special motor provided in the recording part.

With film viewers such as the first form described, in which the size of the screen approximately

corresponds to the format of the instant picture, once the projection screen has been pushed to one side or folded out of the way, the printing part can be placed with the film surface in the plane previously occupied by the screen. These two operations may be combined, for example, the camera is arranged to slide in the viewer and is merely pushed into the recording position from a rest position.

If the format of the picture is slightly smaller than the screen of the viewer, then limiting marks may be provided on the screen. It is then possible to adjust the picture vertically by adjusting the picture frame or by adjusting the mirror of the viewer, whilst a horizontal adjustment is possible for example by sliding the screen with the markings relative to the projected picture. This position can then be transferred to the camera by direct coupling. At the same time the shutter can be set by the above-described pivoting of the mirror 20 to alter the deflection of the projection ray path, or by the displacement of the instant picture part, and also the opening of the shutter can be initiated, possibly after a delay.

The exposure shutter 24 may also be pivoted into the ray path for the printing step. A relatively simple design and control are then sufficient. Furthermore, colour conversion filters which match the spectral sensitivity of the printing material to the projection light can then be pivoted into the ray path for printing.

It is pointed out that with some types of instant picture films an odd number of mirrors is necessary in order to obtain a copy that is the right way round.

100 CLAIMS

1. A projection motion-picture viewer having a still picture projection device, comprising a device for accommodating film sheets which can be exposed using the projection ray path, a shutter for determining a reproducible exposure time for the same and a pair of squeezing rollers for exposed film sheets which device can be coupled to the drive mechanism of the motion picture viewer.

2. A viewer as claimed in claim 1, wherein a projection surface is exchangeable for an instant picture attachment the picture gate of which, in the attached state, lies in the plane of the projected image.

3. A viewer as claimed in claim 1, which has at least one pivotable deflecting mirror by means of which the projection ray path can be directed as desired onto a projection surface or into the picture gate of a sheet-film cassette.

4. A viewer as claimed in claim 3, wherein to produce prints in a scale of reproduction that is different from the projection scale, the projection lens is arranged to slide along the optical axis, this movement being combined with the pivoting movement of the deflecting mirror in such a manner that the different total width between the motion-picture film and the projection surface, and between the motion-picture film and the plane of the film sheet to be exposed, is compensated for.

5. A viewer as claimed in claim 3 or claim 4,



there are connected three slider members or pull rods 21, 22 and 23. The slider member 21 leads to the setting lever 24a of a shutter 24. The lever 22 is connected to the lens 4 which may be displaced along its optical axis. Finally, the slider member 23 acts on the hinged shutter 10a in front of the instant picture film.

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If, on account of the dichroic mirrors or heat filters used, the colour temperature of the light in the projector differs significantly from that required for the recording material, it is possible to fix the required large area correction filter rigidly in the recording part.

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5. A viewer as claimed in claim 3 or claim 4,



wherein the arrangement is such that the pivoting movement of the mirror causes the exposure shutter to be tensioned and an auxiliary shutter to be brought into an open position in front of the

5 cassette.

6. A viewer as claimed in any one of claims 1 to 5, wherein a focal-plane shutter is arranged in front of a sheet-film cassette.

7. A viewer as claimed in any one of claims 1 to 10 6, wherein for printing, a colour correction filter may be pivoted into the projection ray path.

8. A projection motion-picture viewer substantially as hereinbefore described with reference to, and as shown in, the accompanying 15 drawings.

Printed for Her Majesty's Stationery Office, by Croydon Printing Company Limited, Croydon, Surrey, 1982.
Published by The Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.