

PATENT SPECIFICATION

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(54) PROJECTION APPARATUS FOR PRODUCING DISSOLVE EFFECTS

(71) We, AGFA-GEVAERT AKTIENGESSELLSCHAFT, a body corporate recognised, under German Law, of Leverkusen, Germany do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to projection apparatus in which slides are projected alternately from two projectors onto the same screen area, and a dissolve effect is produced between one slide and the next, that is to say, one projected image is faded out while the next is faded in.

The desired fade-in and fade-out is brought about by reducing the voltage in one projector to a low value (which may be zero), while restoring the voltage in the other projector from the reduced value to the full operating value. The difficulty then arises that there is substantially no current available in the faded-out projector to effect the slide change operation. Although this problem can be solved by employing a switching arrangement to provide current from another source, the switching arrangement required tends to be somewhat complicated.

The present invention provides a projection apparatus, which comprises two slide projectors each having a slide change device, and means for controlling the voltage supply to each projector and for controlling the slide change operation, each slide change device being arranged to be operated in response to rotation of an associated inertial member which can be coupled to the device to effect a slide change, and each slide projector including drive means for rotating the corresponding inertial member, which drive means is arranged to be rendered inoperative in response to a voltage reduction in the supply to the projector, the arrangement being such that, in operation, the control means

produces a dissolve effect by reducing the voltage supply to one projector while restoring the voltage supply to the other projector from a reduced value to the full operating value, causes the inertial member in the said other projector to be uncoupled from the slide change device in that projector, and, on completion of the dissolve operation, causes the inertial member of the said one projector to be coupled to its slide change device, and wherein the arrangement is such that, on being coupled to its slide change device, each inertial member effects one slide change operation only.

In apparatus according to the invention, the difficulty of effecting the slide change operation in the faded-out projector is overcome by relatively simple means.

Preferably, the arrangement is such that the rotational energy acquired by each inertial member before its drive means becomes inoperative as a result of the voltage reduction is sufficient to effect one slide change operation only.

Advantageously, each inertial member comprises the fan-wheel of a cooling fan provided in the corresponding projector. Accordingly, any slide projector having a fan wheel (which functions as a flywheel for the purposes of the present invention) can be adapted for use in a projection system for producing dissolve effects. Even inexpensive still projectors may be provided with a suitable fan-wheel, since such a wheel is cheap to produce. Further, the subsequent installation of a suitable fan wheel in a still projector is possible, so enabling the projector to be used in a dissolve arrangement.

Advantageously, there are provided two magnetic couplings each of which is arranged to couple a different one of the inertial members to its corresponding slide change device. There may then be provided switch means for energising and de-energising each coupling, each of the switch

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means being responsive to the control means and being arranged to allow current from the supply circuit in one projector to energise the magnetic coupling in the other projector on being actuated by the control means.

Apparatus constructed in accordance with the invention will now be described, by way of example, with reference to the accompanying drawing, which is a diagrammatic representation of the apparatus.

Referring to the accompanying drawing, the reference numeral 1 indicates a first still projector and the reference numeral 1' indicates a second still projector (the still projectors 1 and 1' may be of different or similar construction), and the reference numeral 2 indicates a dissolve control device. Each of the two projectors 1 and 1' includes a housing 3 or 3' and an objective 4 or 4'. A slide change device of known construction (not shown), is located in each housing 3 or 3'. The fan of each still projector 1 or 1' includes a fan motor 5, 5' for driving a fan wheel 6, 6'. Each fan motor and fan wheel is also accommodated in the housing 3 or 3', but is shown outside the housing 3 or 3' in the drawing for the sake of clarity. The fan wheels 6 and 6' are themselves of heavier construction than usual, so that they can serve as flywheels. Each of the fan wheels 6, 6' is arranged on a spindle 7 or 7', and can be coupled by means of a magnetic coupling (the winding of which is indicated by 8 or 8') to a spindle 9 or 9'. Rotation of the spindle 9 or 9' causes the corresponding slide change device to operate. There will always be a magnetic coupling 8 or 8' if the fan drive motor 5 or 5' also serves as the drive mechanism for the corresponding slide change device.

The control device 2 includes a servo-motor 10 which can be switched on by means of a release contact 11. The servo-motor 10 co-operates by way of a mechanical connection, consisting for example of a spindle 12 and a pinion 13, with two regulating members 14 and 15. The regulating members 14 and 15 have rack portions which engage with the pinion 13 and are moved in opposite directions in response to rotation of the pinion. Each of the regulating members 14 or 15 has a sliding contact 14a or 15a which co-operates with a corresponding resistor arrangement 16 or 17. Each of the two regulating members 14 and 15 can scan the resistor arrangements 16 or 17 by means of its sliding contact 14a or 15a and can also actuate a contact 18 or 19.

The circuit arrangement is as follows: The sliding contacts 14a, 15a are connected by way of connecting leads 20a, 21a to a mains terminal 22. The supply circuit of the

still projector 1 is connected to the mains terminal 22 by way of a connecting lead 20b, the resistor arrangement 16, the sliding contact 14a and the connecting lead 20a. Similarly, the supply circuit of the still projector 1' is connected to the mains terminal 22 by way of a connecting lead 21b, the resistor arrangement 17, the sliding contact 15a and the connecting lead 21a. The fan drive motors 5, 5' are connected to the mains system by way of connecting leads 23, 23'. The windings 8 and 8' of the magnetic couplings of the still projectors 1 and 1' are connected to one another by way of connecting leads 24 and 24' and to the two supply circuits of the still projectors 1 and 1' by way of connecting leads 25 and 25'. The windings 8, 8' of the magnetic couplings are connected to their supply circuit in the corresponding projector by way of connecting leads 26, 26' which include the contacts 18, 19. One terminal of the servo-motor 10 of the control device 2 is connected to the supply circuits of the still projectors 1 and 1' by way of a lead 27, and the other terminal is connected by a lead 28 to the leads 26 and 26' of the windings 8 and 8'.

As can be seen from the drawing, the still projector 1 is shown in the faded-out state, since the sliding contact 14a of the regulating member 14 is in the position in which the maximum resistance value of the resistor arrangement 16 is in circuit. Consequently, the voltage which is applied to the supply circuit of the still projector 1 is at its lowest value (that is to say, zero or almost zero), so that the supply circuit of the still projector 1 is substantially currentless and its projection lamp is off. In this position, the contact 18 is closed by means of the regulating member 14.

The sliding contact 15a of the regulating member 15 is in the position in which the minimum resistance value of the arrangement 17 is in circuit, so that the full operating voltage is fed to the supply circuit of the projector 1'. As a result, when the contact 18 is closed the winding of the magnetic coupling 8 is supplied with current from the supply circuit of the still projector 1', so that a coupling connection is produced between the spindles 7 and 9. Owing to the kinetic energy of the fan wheel 6 (which acts as a flywheel), it continues to rotate after the fan motor 5 is switched off as a result of the voltage drop, and drives the spindle 9, which in turn operates the slide change device of the still projector 1. The coupling connection between the spindles 7 and 9 is maintained for the duration of the slide change operation. The flywheel mass of the fan wheel 6 is so arranged that the kinetic energy it attains while the motor 5 is operative is sufficient to drive the slide

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change device for one slide change operation. As hereinbefore described, the full supply voltage is applied to the supply circuit of the still projector 1', during the slide change which is taking place in the still projector 1, so that an image is projected by the still projector 1' with the projection lamp at its full intensity.

After the slide change is completed in the still projector 1, the release contact 11 is closed. The servo-motor 10 is thus switched on and drives the pinion 13 in an anti-clockwise direction by way of the spindle 12. During this anti-clockwise rotation the regulating members 14 and 15 are moved in opposite directions by means of the pinion 13. By means of the regulating member 14 the contact 18 is opened, so causing the magnetic coupling 8 to be de-energised, and by means of the sliding contact 14a the in-circuit resistance of the arrangement 16 is reduced. The regulating member 15 is moved towards the contact 19, and the sliding contact 15a is moved on the resistor arrangement in such a way that its in-circuit resistance is increased. The result of these measures is that an image is projected by means of the still projector 1' with its projection lamp decreasing in brightness and an image is projected by means of the still projector 1 with its projection lamp increasing in brightness, so producing the required dissolve effect between two images. When the resistance of the resistor arrangement 16 is at its minimum, the full supply voltage corresponding to the operating value is applied to the supply circuit of the still projector 1 and the image therefrom is projected with the projection lamp at full intensity. The contact 11 is opened. At the same time, the in-circuit resistance of the resistor arrangement 17 reaches its maximum, so that a supply voltage corresponding to the lower value is applied to the supply circuit of the still projector 1' and its projection lamp is blacked out. In this phase of operation of the apparatus the regulating member 15 meets and closes the contact 19. The winding 8' of the magnetic coupling of the still projector 1' is therefore supplied with current from the supply circuit of the still projector 1, so that a coupling connection is produced between the spindles 7' and 9'. The acquired kinetic energy of the fan wheel 6' then enables the wheel to operate the slide change device of the still projector 1' for the duration of one slide change operation.

The direction of rotation of the servo motor 10 is reversed (by means not shown) when the release contact 11 is next closed, and the regulating members 14 and 15 then fade out the projected image from projector

1, while fading in the image of the next slide in projector 1'. 65

Instead of using the fan wheel as flywheel, the energy required to operate the slide change device in each projector may be provided by some other inertial member driven by the fan motor (or driven by another motor provided in the projector). 70

WHAT WE CLAIM IS:—

1. A projection apparatus which comprises two slide projectors each having a slide change device, and means for controlling the voltage supply to each projector and for controlling the slide change operation, each slide change device being arranged to be operated in response to rotation of an associated inertial member which can be coupled to the device to effect a slide change, and each slide projector including drive means for rotating the corresponding inertial member, which drive means is arranged to be rendered inoperative in response to a voltage reduction in the supply to the projector, the arrangement being such that, in operation, the control means produces a dissolve effect by reducing the voltage supply to one projector while restoring the voltage supply to the other projector from a reduced value to the full operating value, causes the inertial member in the said other projector to be uncoupled from the slide change device in that projector, and, on completion of the dissolve operation, causes the inertial member of the said one projector to be coupled to its slide change device, and wherein the arrangement is such that, on being coupled to its slide change device, each inertial member effects one slide change operation only. 75 80 85 90 95 100

2. Apparatus as claimed in claim 1, wherein the arrangement is such that the rotational energy acquired by each inertial member before its drive means becomes inoperative as a result of the voltage reduction is sufficient to effect one slide change operation only. 105 110

3. Apparatus as claimed in claim 1 or claim 2, wherein each inertial member comprises the fan-wheel of a cooling fan provided in the corresponding projector. 115

4. Apparatus as claimed in any one of claims 1 to 3, wherein there are provided two magnetic couplings, each of which is arranged to couple a different one of the inertial members to its corresponding slide change device. 120

5. Apparatus as claimed in claim 4, wherein each coupling is provided with switch means for energising and de-energising that coupling, each of the switch means being responsive to the control means and being arranged to allow current from one projector to energise the magnetic 125

change device for one slide change operation. As hereinbefore described, the full supply voltage is applied to the supply circuit of the still projector 1', during the slide change which is taking place in the still projector 1, so that an image is projected by the still projector 1' with the projection lamp at its full intensity.

After the slide change is completed in the still projector 1, the release contact 11 is closed. The servo-motor 10 is thus switched on and drives the pinion 13 in an anti-clockwise direction by way of the spindle 12. During this anti-clockwise rotation the regulating members 14 and 15 are moved in opposite directions by means of the pinion 13. By means of the regulating member 14 the contact 18 is opened, so causing the magnetic coupling 8 to be de-energised, and by means of the sliding contact 14a the in-circuit resistance of the arrangement 16 is reduced. The regulating member 15 is moved towards the contact 19, and the sliding contact 15a is moved on the resistor arrangement in such a way that its in-circuit resistance is increased. The result of these measures is that an image is projected by means of the still projector 1' with its projection lamp decreasing in brightness and an image is projected by means of the still projector 1 with its projection lamp increasing in brightness, so producing the required dissolve effect between two images. When the resistance of the resistor arrangement 16 is at its minimum, the full supply voltage corresponding to the operating value is applied to the supply circuit of the still projector 1 and the image therefrom is projected with the projection lamp at full intensity. The contact 11 is opened. At the same time, the in-circuit resistance of the resistor arrangement 17 reaches its maximum, so that a supply voltage corresponding to the lower value is applied to the supply circuit of the still projector 1' and its projection lamp is blacked out. In this phase of operation of the apparatus the regulating member 15 meets and closes the contact 19. The winding 8' of the magnetic coupling of the still projector 1' is therefore supplied with current from the supply circuit of the still projector 1, so that a coupling connection is produced between the spindles 7' and 9'. The acquired kinetic energy of the fan wheel 6' then enables the wheel to operate the slide change device of the still projector 1' for the duration of one slide change operation.

The direction of rotation of the servo motor 10 is reversed (by means not shown) when the release contact 11 is next closed, and the regulating members 14 and 15 then fade out the projected image from projector

1, while fading in the image of the next slide in projector 1'.

Instead of using the fan wheel as flywheel, the energy required to operate the slide change device in each projector may be provided by some other inertial member driven by the fan motor (or driven by another motor provided in the projector).

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2. Apparatus as claimed in claim 1, wherein the arrangement is such that the rotational energy acquired by each inertial member before its drive means becomes inoperative as a result of the voltage reduction is sufficient to effect one slide change operation only.

3. Apparatus as claimed in claim 1 or claim 2, wherein each inertial member comprises the fan-wheel of a cooling fan provided in the corresponding projector.

4. Apparatus as claimed in any one of claims 1 to 3, wherein there are provided two magnetic couplings, each of which is arranged to couple a different one of the inertial members to its corresponding slide change device.

5. Apparatus as claimed in claim 4, wherein each coupling is provided with switch means for energising and de-energising that coupling, each of the switch means being responsive to the control means and being arranged to allow current from one projector to energise the magnetic



coupling in the other projector on being actuated by the control means.

- 5 6. A projection apparatus constructed substantially as hereinbefore described with reference to, and as shown in, the accompanying drawing.

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