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(54) IMPROVEMENTS IN OR RELATING TO A CINEMATOGRAPHIC CAMERA

(71) We, KARL VOCKENHUBER, of 118 Potzleinsdorferstrasse, Vienna 18, and RAIMUND HAUSER, of 2, Goldegg-Gasse, Vienna 4, both of Austria, both Citizens of Austria, 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 a cinematographic camera, especially to a substandard format film camera for film arranged in a cartridge, said equipment being provided with means for the discovery of jammings in the film transport.

In substandard format film cameras for film arranged in cartridges disturbances sometimes occur because the film jams in the cartridge, and consequently the power requirement necessary for film transport reaches, in a short time, a multiple of the normal power requirement. In such a case the maximum moment of the friction clutch coupling provided in the drive of the take-up reel of the cartridge in much exceeded, so that the friction clutch coupling slips. Simultaneously the claw is pushed out of the perforation of the film, and so the claw cannot take part in driving the film. In this case the amateur will generally not be aware of the disturbance in the film transport, particularly because most of the used film counters are controlled by the camera gear, and in spite of the stationary film indicate a transport.

According to a known suggestion the camera is provided with a signalling disk, which is directly driven by the ratchet wheel operating the take-up reel of the cartridge. This signalling disk bears radially running lines on its front side, which are visible through a window on the surface of the camera. During normal function the signalling disk rotates, but it is stationary when

the film jams. The disadvantage of this arrangement is, that the film amateur has to watch the signalling disk continually and in case of jamming no appropriate signal is given. In spite of this arrangement it is therefore possible that a disturbance is not discovered until too late, which is annoying when the shots cannot be repeated.

The invention provides a cinematographic camera having means for the discovery of jammings in the film transport, characterised in that an electrical pulse generator is provided, which is cyclically operable by the drive of the take-up reel or by the motion of the film and which is connected by alternating current conducting means with a control circuit which is switched on simultaneously with starting the film drive and which contains a capacitor which is cyclically charged and discharged respectively in accordance with the frequency of the impulses given by said electrical pulse generator, the control circuit comprising voltage-checking means for checking the voltage across the capacitor and releasing a signal when the impulses given by the electrical pulse generator fall below a minimum frequency, and hence the voltage accruing at the capacitor differs from a predetermined threshold value.

According to the present arrangement the user's attention is immediately drawn to the defect by means of a positive signal, which appears when the film transport jams. The signal may be given acoustically or optically. In the latter case it is advisable to locate the optical signalling device in the viewfinder of the camera.

According to a preferred embodiment of the invention, a voltmeter device is provided, which is connected with the battery of the camera drive and which inserts an additional resistance in the charging and discharging circuit respectively, when the battery voltage falls below the minimum

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voltage of operation. As a result the time constant of this circuit is much reduced, so that the voltage at the capacitor fluctuates in accordance with the frequency of the impulses derived from the electrical impulse generator and a cyclic signal is given out by the circuit. In this way the attention of the camera operator is drawn towards another cause of disturbance, namely an undue fall-off of the battery voltage of the driving motor of the camera. As is well known, falling below the minimum of operation voltage involves a fall-off of the image frequency and with it an overexposure of the particular image as well as a certain time-lapse effect in the performance. As opposed to the case of transport jamming, further shots are of course still possible in this case though the quality is reduced. As in the one case a continuous, and in the other case an intermittent signal appears, the cause of disturbance is easily to be recognised.

The invention will be further described with reference to two embodiments shown by way of example only in the accompanying drawings, wherein:

Figure 1 shows schematically a substandard format film camera adapted to receive Super 8 cartridges, wherein all those parts non-essential for the invention have been omitted;

Figure 2 shows the circuit diagram of the camera represented in Figure 1; and

Figure 3 illustrates the circuit diagram of a modified embodiment.

In Figure 1 a Super 8 substandard format film camera has a housing 1 which contains a film cartridge 2. By means of an optical system 3 and 4 an image of the objective is projected on the film 6 lying free in the cartridge gate 5. By means of a partially light-permeable mirror 7 in the path of rays of the objective, a part of the light incident from the objective is deviated to a viewfinder system, which comprises a further mirror 8 and an eyepiece 9. For the sake of clear illustration the objective diaphragm, the shutter and the claw of the film transport with the pertaining drive devices have all been omitted. The film 6 is transported step by step in the range of the cartridge gate 5 by means of the said claw and is wound on the take-up reel arranged inside the cartridge, the coupling piece of the said take-up reel being designated 10 in Figure 1. The coupling piece 10 cooperates with a catch 11 of the camera, which catch is arranged on the shaft of a gear wheel 12. This gear wheel is driven by a pinion 13, which is rotatably arranged on the shaft 14 of a worm gear 15. The worm gear 15 mates with the worm 16 on the shaft of the camera motor 17. For balancing to compensate for the changing diameter of the take-up reel in

the cartridge 2, a friction clutch coupling is provided between the worm gear 15 and the pinion 13. This friction clutch coupling comprises a friction disk 18 abutting the pinion 13, and a spring 19. For the sake of an exact frame steadiness in film recording, the friction clutch coupling 18, 19 is adjusted in a way to roll up only the film quantity that is transported by the claw in the range of the cartridge gate. The moment defined by the friction clutch coupling 18, 19 should therefore not reach too high a value, so that the friction of the film 6 in the cartridge gate 5 is overcome. One plane side of the gear wheel 12 is coated with an essentially star-shaped contact disk 20 on which brushes 21 and 22 rub. The parts 20 and 22 form an electric switch, which, upon rotation of the gear wheel 12 gives out impulses. Instead of being driven directly by the take-up reel 10, the electric switch 20-22 may, for example, be mounted on a sprocket wheel driven by the film 6.

A signalling lamp 23 is arranged in the path of rays of the viewfinder. Between the viewfinder eyepiece 9 and the signalling lamp 23 is provided a filter 24 showing a red-coloured zone 25 and a green-coloured zone 26. The filter 24 is adjustable by means of a key 27, which simultaneously operates a switch 28. The camera release is indicated at 29, and a key 30 which laterally abuts the film 6 operates a switch 31 by means of a pin.

The mode of operation of the present arrangement is set forth in the following according to the circuit diagram illustrated in Figure 2. By means of the camera release 29, the camera motor 17 and the switch 20-22 are connected to a battery 32. In disturbance-free operation the motor 17 drives the gear wheel 12 by means of the friction clutch 18, 19. Impulses are given by the switch 20-22, which is controlled by this gear wheel. These impulses are transmitted by means of a condenser 33 to the base of an NPN transistor 34. Upon the arrival of an impulse, the transistor 34 becomes conductive and thus bridges across the condenser 35 by means of which it is discharged. The condenser 35 lies in the base-emitting-circuit of an NPN transistor 36 and is constantly charged by the battery by means of a charging resistor 37. The time constant of the circuit 35 and 37 is chosen in such a way that at the minimum frequency of the switch 20-22 occurring with normal operation (maximum diameter of the take-up reel in the cartridge 2) the condenser 35 is always discharged so that the transistor 36 remains locked. As soon as a jamming in the film transport occurs, the moment at the coupling 10 of the film cartridge 2 rises so much that the friction clutch coupling 18, 19 slips and the gear wheel 12 is stopped.

Consequently the impulses at the base of the transistor 34 fail to arrive and the transistor 34 therefore remains locked. The voltage at the condenser 35 increases so that the transistor 36 becomes conductive and causes the signalling lamp 23 arranged in the collector circuit to light up.

Parallel to the transistor 36 there is provided the switch 31, which is operated by the key 30 resting on the film edge. The film end of Super 8 films has a lateral notch 37. As soon as this notch enters the cartridge gate 5, the key 30 falls into the notch and closes the switch 31, so that the lamp lights up also after the run-off of the whole film length. The jamming signal appears also when the camera is released and there is no cartridge 2 in the camera.

Parallel to the switch 31 there may be provided some further switches 38, which are actuated in case of jamming or defective operation. For instance the switch 38 may be energized by an exposure control device causing the signalling lamp 23 to light up when the lighting of the scene is insufficient. The switch 38 may also be controlled by other equipment cooperating with the camera, for instance a tape recorder or lighting device and thus may indicate the defective operation or any disturbance in the equipment.

An electronic speed regulating device 39 is arranged in series with the camera motor, which speed regulating device controls the voltage of the motor terminals as a function of the feeding voltage and the current taken.

In the further development of the invention a blocking voltage is inserted in the speed regulating device 39 by means of a conductor 40 when the transistor opens, thus causing the camera motor to be out of circuit. As in this case the camera drive is interrupted when a jamming of the film transport occurs, a signalling device could be omitted.

In order to be able to indicate before filming, whether the camera is ready for operation, i.e., particularly whether the voltage of the battery 32 is sufficient to reach the nominal frame frequency, the circuit can be connected with a voltmeter circuit by means of a switch 28. The contact 28a of the switch 28 bridges across the camera release 29. By means of the contact 28b an adjustable resistor 41 and a voltage divider 42, 43 are inserted. 43 is a voltage dependent resistor, which in this embodiment comprises two diodes. With the same success Zener diodes may be used. The resistor 42 is dependent on temperature and compensates the influence of temperature on the circuit. By the contact 28c the central tapping of the voltage divider 42, 43 is connected with the transistor 34. Should the voltage 32 exceed a threshold value adjusted by the re-

sistor 41, the transistor 34 locks. The voltage at the condenser 35 therefore adopts its maximum value and as a result the transistor 36 opens and the lamp 23 lights up.

For voltage control a circuit was chosen, 70 which with a voltage exceeding the minimum value of operation, brings about a positive signal, that is the lighting up of a lamp, since with complete breakdown of the battery such a signal would not be possible. 75 In order to clearly distinguish the signal of voltage control indicating the readiness of operation of the equipment from the signal of disturbance, the red filter 25 which is normally in the line of sight to the signalling 80 lamp is swung out of the light path by means of the control key 27 with simultaneous operation of the contacts 28a to 28c, and a green filter 26 is swung into the light path between the signalling lamp 23 and 85 the eyepiece 9.

The arrangement illustrated in Figure 3 in a circuit diagram differs from the arrangement described above especially with respect to the kind of voltage control. Parallel 90 to the terminals of the battery 32 are located a Zener diode 44 and an adjustable resistor 45. The central tapping of the voltage depending divider formed by said Zener diode 44 and the resistor 45, is connected with the 95 base of a PNP transistor 46, the collector of which is connected with the collector of the transistor 34. The emitter of the transistor 46 is connected with one terminal of the battery 32 by means of a resistor 47 and 100 with the other terminal of the battery 32 by means of a resistor 48. The resistance of the resistor 47 is considerably lower than that of the resistor 37. When the voltage of the battery 32 falls below the threshold 105 value set by the resistor 45, the transistor 46 becomes conductive and inserts the resistor 47 in the charging circuit of the condenser 35. As a result the time constant of this circuit is essentially decreased, so that 110 the full voltage accrues at the condenser 35 immediately after the transistor 34 is locked and the signalling lamp 23 is switched on by means of the transistor 36. In this way the signalling lamp 23 lights up in the rhythm 115 of the switch 20-22 upon undue decrease of the battery voltage.

Various modifications may be made within the scope of the invention as defined by the appended claims. Thus the transistors 120 of the embodiments may be replaced by electronic valves, relays or other amplifiers or circuit elements respectively.

WHAT WE CLAIM IS:

1. A cinematographic camera having 125 means for the discovery of jamming in the film transport, characterised in that an electrical pulse generator is provided, which is cyclically operable by the drive of the take- 130

Consequently the impulses at the base of the transistor 34 fail to arrive and the transistor 34 therefore remains locked. The voltage at the condenser 35 increases so that the transistor 36 becomes conductive and causes the signalling lamp 23 arranged in the collector circuit to light up.

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An electronic speed regulating device 39 is arranged in series with the camera motor, which speed regulating device controls the voltage of the motor terminals as a function of the feeding voltage and the current taken.

In the further development of the invention a blocking voltage is inserted in the speed regulating device 39 by means of a conductor 40 when the transistor opens, thus causing the camera motor to be out of circuit. As in this case the camera drive is interrupted when a jamming of the film transport occurs, a signalling device could be omitted.

In order to be able to indicate before filming, whether the camera is ready for operation, i.e., particularly whether the voltage of the battery 32 is sufficient to reach the nominal frame frequency, the circuit can be connected with a voltmeter circuit by means of a switch 28. The contact 28a of the switch 28 bridges across the camera release 29. By means of the contact 28b an adjustable resistor 41 and a voltage divider 42, 43 are inserted. 43 is a voltage dependent resistor, which in this embodiment comprises two diodes. With the same success Zener diodes may be used. The resistor 42 is dependent on temperature and compensates the influence of temperature on the circuit. By the contact 28c the central tapping of the voltage divider 42, 43 is connected with the transistor 34. Should the voltage 32 exceed a threshold value adjusted by the re-

sistor 41, the transistor 34 locks. The voltage at the condenser 35 therefore adopts its maximum value and as a result the transistor 36 opens and the lamp 23 lights up.

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Various modifications may be made within the scope of the invention as defined by the appended claims. Thus the transistors of the embodiments may be replaced by electronic valves, relays or other amplifiers or circuit elements respectively.

WHAT WE CLAIM IS:

1. A cinematographic camera having means for the discovery of jamming in the film transport, characterised in that an electrical pulse generator is provided, which is cyclically operable by the drive of the take-



up reel or by the motion of the film and which is connected by alternating current conducting means with a control circuit which is switched on simultaneously with starting the film drive and which contains a capacitor which is cyclically charged and discharged respectively in accordance with the frequency of the impulses given by said electrical pulse generator, the control circuit comprising voltage-checking means for checking the voltage across the capacitor and releasing a signal when the impulses given by the electrical pulse generator fall below a minimum frequency, and hence the voltage accruing at the capacitor differs from a predetermined threshold value.

2. A cinematographic camera as claimed in claim 1, characterised in that the signal released by the control circuit controls an electronic switch, or a relay in the circuit of the film driving motor, and which switches off the driving motor when the frequency of the impulses derived from the film or the drive of the take-up reel, respectively, fall below a minimum frequency.

3. A cinematographic camera as claimed in claim 1 or 2, wherein in the control circuit, which is controlled by the electrical pulse generator, a capacitor is connected with the current source of the camera driving motor and is cyclically loaded, and wherein parallel to the capacitor a resistor is provided, characterised in that the voltage accruing at the capacitor is preferably compared with a stabilised voltage and upon falling below a predetermined voltage value caused by a decrease of the impulse frequency and/or the voltage of the current source, releases a signal.

4. A cinematographic camera as claimed in claim 1, characterized in that a voltmeter device is connected with the battery of the camera driving motor and inserts an additional resistance in the charging and discharging circuit respectively of the capacitor and considerably reduces the time constant thereof when the battery voltage falls below the minimum operation voltage, so that the voltage at the capacitor fluctuates in accordance with the rhythm of the impulses derived from the electrical pulse generator and a cyclic signal is given out by the control circuit.

5. A cinematographic camera as claimed in claim 1, characterized in that a switch controlled by the take-up reel or by the moving film is provided in the circuit of a direct current source, which is capacitatively connected with the input of a first amplifier switching it on in the rhythm of the impulses derived from the switch, whereby the output

of said first amplifier is connected with the terminals of a condenser, which is loaded by means of a resistor, and unloads this latter cyclically, this condenser lying in the input circuit of a second amplifier, in the output circuit of which is arranged a signalling lamp or the like, and switches on the latter when the voltage at the condenser exceeds a predetermined value.

6. A cinematographic camera as claimed in claim 5, characterized in that the signalling lamp is arranged in the path of rays of the camera viewfinder.

7. A cinematographic camera as claimed in claim 5, characterized in that switches are arranged parallel to the output of the second amplifier, which are operated for instance by a film cartridge or by a film and which switch on the signalling lamp when for instance no cartridge or no film is in the equipment.

8. A cinematographic camera as claimed in claim 1, characterized by a measuring circuit connectable by means of a control switch with the battery of the camera driving motor and provided with voltage depending resistors, which supply the capacity with a voltage that brings about the release of the signal when the voltage of the battery of the camera driving motor is at least equal to the minimum voltage of operation.

9. A cinematographic camera as claimed in claim 5 or 8, characterized in that the input of the first amplifier is connected with the measuring circuit by means of a switch, so that upon putting to a voltage that is higher or equal to the minimum voltage of operation of the battery of the camera driving motor, the amplifier is locked, the capacitor therefor reaches its maximum voltage and by means of the second amplifier the signal is released.

10. A cinematographic camera as claimed in claim 8 or 9 with a signalling lamp arranged in the viewfinder, characterized in that a colour filter is connected in series to the lamp, which is adjustable by the control switch, so that in case of voltage control and notice of disturbance the signal appears in different colours.

11. A cinematographic camera substantially as herein described with reference to Figures 1 and 2 of the accompanying drawings.

12. A cinematographic camera substantially as herein described with reference to Figures 1 and 3 of the accompanying drawings.

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