

PATENT SPECIFICATION

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(54) IMPROVEMENTS IN AND RELATING TO CAMERAS

(71) We, AGFA-GEVAERT AKTIEN-GESELLSCHAFT, a body corporate organised according to the laws of Germany, 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:—

The present invention relates to a camera for use with roll film.

Cameras have previously been proposed which have a rapidwind lever mechanism that, when the lever is rotated through approximately 180°, transports the film and simultaneously performs further functions, for example, tensions the shutter, advances a flash-cube, tensions a mechanism for the impact ignition of a percussive flash, and is then returned to its initial position by a return spring. The amount of the film advance is determined, for example, by a film feeler member or by means of a film sprocket, which rotates, for example, once per frame.

As a result of the increasing diameter of the film takeup spool as film is wound on to it, the angle of rotation of the rapid-wind lever becomes increasingly smaller, since the feeler dropping into a perforation, for example, stops the rotary movement of the rapid-wind lever. The total actuation force on the switching lever must, therefore, suddenly be absorbed by locking means that acts in one sense only. The result is that the additional functions must be terminated at the smallest possible angle of rotation of the rapid-wind lever and must, therefore, be uncoupled at larger angles. This means that the force at the rapid-wind lever, becomes very large. It has been proposed to avoid these difficulties by coupling the rapid-wind lever to the film spool and the shutter tensioning mechanism by means of a differential coupling which is controlled by a metering roller.

The invention provides a camera for use with roll film which has a perforation associated with each frame and including film

transport drive means, a differential mechanism for transmitting force from the film transport drive means to two outputs one of which comprises a film spool drive means, a locking member for the other output and a feeler member arranged to engage a perforation at the end of a film transport operation, the feeler member being so interconnected with the locking member that when the feeler member is disengaged from the perforations during film transport the locking member is engaged with the other output and when the feeler member engages a perforation it is arranged to cause the locking member to disengage from the other output to lock the one output.

As the rapid-wind lever must return, the tensioning movement must be effected by means of a unidirectional coupling. The feeler member is, preferably, arranged to engage an extension on the locking member and there is provided first resilient means tending to urge the feeler member into engagement with the film and second resilient means acting counter to the first resilient means and tending to urge the locking member into engagement with the other output, the arrangement being such that the first resilient means exerts a greater force on the locking member than does the second resilient means so that when the feeler member engages a perforation the feeler member is driven out of engagement with the other output.

Advantageously, a film transport drive means is connected to a supporting member carrying one or more planetary gears, the planetary gear or at least one of the planetary gears meshing with an annular gear which is connected to the one output and the planetary gear or at least one of the planetary gears meshing with a sun gear connected to the other output. Alternatively, other forms of differential mechanism may be used in which the input is connected to film transport drive means and one of two outputs is connected to a film spool drive member the other being connected to a drive take-off member, each of

the outputs being lockable alternately. Preferably, the supporting member is formed in one piece with a film transport handle.

By means of the above described arrangement a film transport handle, after film transport has ended, can be moved further to tension a shutter or rotate a flash-cube socket. A further advantage, is that when multiple actuation of the handle is required, for example, during the advance of a film leader or tail section, when the handle returns since the feeler has not yet dropped into a perforation the locking member slides over a ratchet wheel, and thus an acoustic signal is emitted to indicate that a further film transport actuation is necessary.

Several forms of camera constructed in accordance with the invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Fig. 1 is a diagrammatic view of a differential mechanism for a camera,

Fig. 2 is a view, in section of part of a first form of camera,

Fig. 3 is a plan view of part of the first form of camera shown in Fig. 2,

Fig. 4 is a view in section of a second form of camera.

Referring now to Fig. 1, of the accompanying drawings, a connecting piece 204 of a differential gear carries, on its periphery, a locking toothed section 204a with which a locking member 203 is arranged to cooperate. Gearwheels 204b and 204c are rigidly mounted on a common axis which is rotatably supported in the connecting piece 204. A gear-wheel 201a, which is coupled to a transport lever 201, meshes with the gearwheel 204b. When the locking member 203 is engaged with the section 204c, during film transport, the gearwheel 201a rotates the gearwheel 204b causing rotation in turn of the gear-204c, a gearwheel 202a, with which the gearwheel 204c meshes, and consequently of a film key 202. If the locking member 203 is released the force exerted by the gearwheel 201a is transmitted by the axis of the gearwheel 204b to the connecting piece 204 and the gearwheel 204c merely rolls on the surface of the gearwheel 202a of the film transport by means of a film metering device.

Figs. 2 and 3 show a construction similar in principle, to the arrangement shown in Fig. 1, but having a hollow gearwheel as central gear-wheel, and with the transport lever driving the connecting piece.

A spindle 11 connects a transport lever 10 to a tensioning disc 12 and is supported in a hollow sleeve 13 which is fixed to a plate 14. The plate 14 is screwed to a camera housing 15. A central gear-wheel 16 is connected to a drive disc 17 and carries two toothed sections 17a and 16a, of which the

toothed section 17a is a locking toothed section. A connecting piece 18 carries planetary gear-wheels 19, which co-operate with the toothed section 16a of the central gear 16 and a gearwheel 22a of a spool drive member 22. A film key 20 engages a film spool 23, onto which film 24 having a perforation 24a is wound. A two-part locking member 30 and 30a is rivetted to a sleeve 26, fixed to a pin 27, and held in the locking toothed section 17a by means of a hairpin spring 28. A film feeler member 31 is rivetted to a sleeve 32, is fixed to a pin 33, and is pressed by a hairpin spring 34 with a finger 31a against the film 24.

The method of operation is as follows: When the transport lever 10 is actuated in the direction of the arrow 35 counter to the action of a return spring 36, the connecting piece 18 is rotated by a lug 12a and thus the gear-wheel 22a is rotated by the planetary gears 19, since the gear-wheel 16/17 is held by means of the locking member 30a which has dropped into place. The film spool 23 is thereby rotated by means of the film key 20 and the film 24 is thus advanced until the feeler 31a drops into a perforation 24a. An eccentric 30b thereby lifts the locking member 30a out of the locking toothed section 17a. At this moment, the gearwheel 16, 17 is freed and begins to rotate, since the friction of the film in a film channel and the feeler 31a hold the gear-wheel 22 stationary. A non-return device which is not shown prevents the unwinding of the film from the film spool.

It is apparent from the above description that the film 24 and the central gear-wheel 22, controlled by a film feeler 31 dropping into place, come to a stop, but the transport lever 10 can be moved further in the direction of the arrow 35 until the lug 12a meets a fixed stop at the end of the slot 18a which surrounds it. Within the tensioning movement, over the whole tensioning angle of the transport lever 10, the shutter and the impact ignition are, for example, tensioned, the rotation of the flash-cube is effected, and the release pawl is engaged and held until the camera release member is actuated. For the sake of clarity, these further tensioning functions are not shown, but may, for example, be actuated by the tensioning disc 12. The transport lever 10 is returned by its return spring 36, and the off-drive by way of the connecting piece 18 is effected in the opposite direction of rotation, since the locking member 30a is lifted out and the gear-wheel 22 is still held by the film pull and a return arrangement which is not shown. When the shutter is released, in a known manner which is not shown, the film feeler 31 is pulled out of the perforation 24a again so that the locking member 30a drops into the locking toothed section 17a again and holds the gear-

wheel 16,17. The arrangement is thus ready again for another transport operation.

The arrangement shown in Fig. 4 differs from that shown in Figs. 2 and 3 in that the rapid-wind lever 10 is replaced by a film transport knob 110. This at the same time forms a connecting piece 118 on which planetary gears 119 are supported. A non-return pawl is arranged to engage with a locking toothed section 110a. The transport knob 110 may project out of the camera housing at a corner. The gear-wheel 119 engages both with a gear-wheel 116a of a disc 116/117, into a locking toothed section 117a of which a locking member (not shown in this Figure) can drop, and with a gear-wheel 122a of a spool drive member 122. The locking member is again so arranged that it blocks the disc 117 when a feeler co-operating with a film perforation (24a in Fig. 3) has not dropped into a perforation. When the feeler drops into a perforation, the locking member releases the disc 117. The method of operation is otherwise the same as in the arrangements shown in Figs. 2 to 4. On the film transport knob 110 a further toothed section 110b may be provided which drives the shutter tensioning means.

It is common to all arrangements in accordance with the invention that the locking member does not act directly on the film transport member but with an output member interconnected with the film transport member by a differential mechanism, and locks the output member as long as the film is being transported, releasing the output member when film transport is completed. The result obtained by this is that the film transport member can be actuated further when the film transport is already terminated. This over-run may be of great advantage for the shutter tensioning operation and the driving of a socket for a flash-cube. A further advantage consists in the fact that, when the output member is a ratchet wheel 17a, the locking member, when multiple actuation of the film transport member is necessary without the feeler engaging a perforation, slides over the ratchet wheel 17a during the return of the film transport member 10, and thus provides an acoustic signal for film leader or tail section or further actuation of the handle.

Further arrangements, which are not shown in the drawings for the sake of simplicity, are of course possible. Thus the discs 16/17 with gear-wheels 16a and 17a or other rigidly connected parts may be of one-piece plastic construction. In addition, two groups of planetary gears could be supported on the

connecting piece 18, one meshing with the gear-wheel 16a and one with the gear-wheel 22a. Finally, the gear-wheel differential could be replaced by another known differential mechanism, for example, a lever or cam differential.

WHAT WE CLAIM IS:—

1. A camera for use with roll film which has a perforation associated with each frame and including film transport drive means, a differential mechanism for transmitting force from the film transport drive means to two outputs, one of which comprises a film spool drive means, a locking member for the other output and a feeler member arranged to engage a perforation at the end of a film transport operation, the feeler member being so interconnected with the locking member that when the feeler member is disengaged from the perforations during film transport the locking member is engaged with the other output and when the feeler member engages a perforation it is arranged to cause the locking member to disengage from the other output to lock the one output.

2. A camera as claimed in claim 1, wherein the said other output comprises a ratchet wheel and the locking member comprises a locking pawl.

3. A camera as claimed in claim 1 or claim 2 wherein the feeler member is arranged to engage an extension on the locking member and there is provided first resilient means tending to urge the feeler member into engagement with the film and second resilient means acting counter to the first resilient means and tending to urge the locking member into engagement with the other output, the arrangement being such that the first resilient means exerts a greater force on the locking member than does the second resilient means so that when the feeler member engages a perforation the locking member is driven out of engagement with the other output.

5. A camera as claimed in any one of claims 1 to 4, wherein a film transport drive means is connected to a supporting member carrying one or more planetary gears, the planetary gear or at least one of the planetary gears meshing with an annular gear which is connected to the one output and the planetary gear or at least one of the planetary gears meshing with a sun gear connected to the other output.

6. A camera as claimed in claim 5, wherein the supporting member is formed in one piece with a film transport handle.

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wheel 16,17. The arrangement is thus ready again for another transport operation.

The arrangement shown in Fig. 4 differs from that shown in Figs. 2 and 3 in that the rapid-wind lever 10 is replaced by a film transport knob 110. This at the same time forms a connecting piece 118 on which planetary gears 119 are supported. A non-return pawl is arranged to engage with a locking toothed section 110a. The transport knob 110 may project out of the camera housing at a corner. The gear-wheel 119 engages both with a gear-wheel 116a of a disc 116/117, into a locking toothed section 117a of which a locking member (not shown in this Figure) can drop, and with a gear-wheel 122a of a spool drive member 122. The locking member is again so arranged that it blocks the disc 117 when a feeler co-operating with a film perforation (24a in Fig. 3) has not dropped into a perforation. When the feeler drops into a perforation, the locking member releases the disc 117. The method of operation is otherwise the same as in the arrangements shown in Figs. 2 to 4. On the film transport knob 110 a further toothed section 110b may be provided which drives the shutter tensioning means.

It is common to all arrangements in accordance with the invention that the locking member does not act directly on the film transport member but with an output member interconnected with the film transport member by a differential mechanism, and locks the output member as long as the film is being transported, releasing the output member when film transport is completed. The result obtained by this is that the film transport member can be actuated further when the film transport is already terminated. This over-run may be of great advantage for the shutter tensioning operation and the driving of a socket for a flash-cube. A further advantage consists in the fact that, when the output member is a ratchet wheel 17a, the locking member, when multiple actuation of the film transport member is necessary without the feeler engaging a perforation, slides over the ratchet wheel 17a during the return of the film transport member 10, and thus provides an acoustic signal for film leader or tail section or further actuation of the handle.

Further arrangements, which are not shown in the drawings for the sake of simplicity, are of course possible. Thus the discs 16/17 with gear-wheels 16a and 17a or other rigidly connected parts may be of one-piece plastic construction. In addition, two groups of planetary gears could be supported on the

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2. A camera as claimed in claim 1, wherein the said other output comprises a ratchet wheel and the locking member comprises a locking pawl.

3. A camera as claimed in claim 1 or claim 2 wherein the feeler member is arranged to engage an extension on the locking member and there is provided first resilient means tending to urge the feeler member into engagement with the film and second resilient means acting counter to the first resilient means and tending to urge the locking member into engagement with the other output, the arrangement being such that the first resilient means exerts a greater force on the locking member than does the second resilient means so that when the feeler member engages a perforation the locking member is driven out of engagement with the other output.

5. A camera as claimed in any one of claims 1 to 4, wherein a film transport drive means is connected to a supporting member carrying one or more planetary gears, the planetary gear or at least one of the planetary gears meshing with an annular gear which is connected to the one output and the planetary gear or at least one of the planetary gears meshing with a sun gear connected to the other output.

6. A camera as claimed in claim 5, wherein the supporting member is formed in one piece with a film transport handle.



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7. A camera for use with roll film substantially as hereinbefore described, with reference to, and as shown in, Fig. 1, Figs. 2 and 3, or Fig. 4 of the accompanying drawings.
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ABEL & IMRAY,
Chartered Patent Agents,
Northumberland House,
303—306 High Holborn,
London, WC1V 7LH.

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