

PATENT SPECIFICATION

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(54) STILL CAMERA

(71) We, AGFA - GEVAERT AKTIEN-GESELLSCHAFT, a body corporate organised according to the laws of the Federal Republic of Germany, of Leverkusen, Federal Republic of 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 invention relates to still cameras, and especially to the transport mechanisms of such cameras.

The Applicants' British Patent Specification No. 1 408 645 describes and claims 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.

The invention provides a still camera for use with roll film having a perforation associated with each frame, which camera comprises a feeler arranged to engage a perforation at the end of film transport, a film transport control, a mechanism for transmitting force from the transport control to a film spool in the camera, which mechanism includes a gearwheel, an arm on which the gearwheel is rotatably mounted and which is pivotable to displace the gearwheel to disengage the drive from the transport control to the spool, and a locking member, the feeler being so interconnected with the locking member that when the feeler is disengaged from a perforation during film trans-

port, the locking member holds the arm in the position where there is a drive connection from the transport control to the film spool, and when the feeler engages a perforation at the end of film transport, it is arranged to cause the locking member to release the arm to permit its movement to a position where the drive to the film spool is disengaged.

By means of the invention, it is possible to have simpler forms of gear wheel and bearings thereof, for example, by avoiding a toothed rim with internal teeth, or the mounting of planetary wheels on a gear wheel. The gear system of the invention can be made of components that are simpler and more easily assembled.

The pivotal arm may be spring-biased into the drive connection position. The arrangement is advantageously such that at the end of film transport, the friction of the film and/or in the mechanism is such that the gearwheel is blocked so that, on further actuation of the control, the gearwheel pivots the pivotable arm to the position where the drive to the film spool is disengaged.

The feeler may be arranged to be taken along a small distance by the moving film after falling into a perforation, and has a projection which registers with a recess in the locking member after that small movement to permit the movement of the locking member to release the pivotable arm. The locking member may be under the action of a spring which urges it into the locking position. A further member which is connected with a component to be tensioned, and operating during the shutter process and which is in working connection with the locking member may be so arranged that the locking member is releasable for pivoting into its locking position when the shutter is in operation or when its operation is complete, and is releasable for pivoting into a position where it does not lock the pivotable arm during the tensioning movement. The further member may include a spring to be tensioned and untensioned by a control lever, which spring in its tensioned state

urges the locking lever out of its locking position. The spring that moves the locking member out of its locking position may be stronger than the spring that urges the locking member into its locked position.

Advantageously, the locking member is under the action of first resilient means which urges the locking member into its locking position and second resilient means which urges the locking member in the opposite direction and which is capable of selectively exerting a greater and a lesser force on the member than the first resilient means. Preferably, the second resilient means is tensioned to its greater value during shutter tensioning, and preferably the arrangement is such that the locking member is held in its locking position by the feeler after shutter tensioning. Preferably, the feeler is arranged to be taken along a small distance by the moving film after falling into a perforation, and has a projection which registers with a recess in the locking member after that small movement to permit the locking member to move away from its locking position.

Advantageously, the arrangement is such that, at the end of film transport, the friction of the film and/or in the mechanism is such that the gearwheel is blocked so that, on further actuation of the control, the gearwheel pivots the pivotable arm to the position where the drive to the film spool is disengaged.

A film transport mechanism for a still camera, constructed in accordance with the invention, will now be described, by way of example, with reference to the accompanying drawing, in which the mechanism is shown schematically.

A film transport slide 501 of the camera is secured to a guide bar 501a, which is slidable through guides in the camera. An arm 502a bearing a load limit stop spring 502 is fixedly mounted on the guide bar 501a. In addition, a rack 503 is slidably mounted on the guide bar 501a in such a manner that projections 503a and 503b extending therefrom enclose between them the load limit stop spring 502. The rack 503 therefore has a very small amount of play relative to the transport slide 501. The purpose of this is to give a smoother feel to the slide 501 when it is being actuated.

A gear wheel 504 is in continuous engagement with the rack 503. This gear wheel meshes with a further gear wheel 505 and when a film cartridge 506 is inserted, this latter wheel engages with a gear wheel 507 of the cartridge 506 connected to the film take-up spool. The rack 503, and the gearwheels 504, 505 and 507 are all located in the same plane at the bottom of the cartridge 506.

The gearwheel 504 is rotatably mounted

on a fixed axis on an arm 508 pivotable about the axis 509 and is in mesh with the gearwheel 505 which is rotatably mounted on the axis 509 of pivoting of the arm. The arm is located in a plane above that of the gearwheels.

The arm 508 is pulled towards the position shown in the Figure by means of a spring 510, and may be locked in that position by means of the engagement of a nose 518 extending from the upper face of the arm 508 and a locking lever 515. When the arm 508 is not locked by the lever 515, it can pivot either side of the central position against the force of the spring 510 and, in so doing, disengage the drive connection from the slide 501 to the film spool.

Reverse movement of the gearwheel 505, that is, movement corresponding to movement of the film in the opposite direction to film advance, is prevented by means of a stop pawl 511.

The camera is also provided with: a feeler 512 for detecting film perforations, one perforation being provided for each frame in the film; two springs 513, 514 acting on the feeler 512, which urge the feeler against the film and against the advance direction of the film; the locking lever 515 which is pivotable about the axis 516 and has a locking edge 515a and a recess 515b, the recess 515b co-operating with a projection 512a of the feeler 512, and the lever 515 being under the action of a first spring 517 which urges the lever against the side edge of the nose 518 on the arm 508; and a second spring 519 which urges the lever 515 away from the side edge of the nose 518. The spring 519 can be tensioned to be stronger than the spring 517. Finally, a control lever 520, which is pivotable about the axis 521 and is under the action of a spring 522, bears against a hook 523 of an arm which is pivoted at the shutter drive means 524. The shutter plate is indicated by the numeral 525 and the release mechanism by the numeral 526.

It should be pointed out that the parts 524 to 526 are of course in practice arranged in a plane perpendicular to the optical axis of the camera, for example, between the lens and the film.

When the transport slide 501 is actuated in the direction of the arrow 527, the shutter drive means 524 is tensioned, during which it slides over an inclined face in the shutter plate 525 into a position behind the plate 525 and also behind the release mechanism 526. The curved arm of the shutter drive means 524 slides over the lug at the upper end (as seen in the drawing) of the part 525. After shutter release, the curved arm engages that lug and turns the blade 525 counterclockwise to open the shutter: then it slips away from the lug and the blade is

turned back by the force of a spring secured to it. The shutter drive means 524 may be locked in its tensioned position by the engagement of the pin joining it to the pawl 523 behind the lug on the release 526. Other kinds of shutters can of course be employed to displace the lever 523.

In the course of the shutter tensioning, the control lever 520 is driven in a clockwise direction by means of the hook 523, which is under the action of a lightly tensioned spring 528 and which slides along a pin 529. This causes a pin 520a on the lever 520 to press on the spring 519 and tension it. The arm 519a of the spring 519 therefore urges the locking lever 515 to rotate in an anti-clockwise direction, since the force of the spring 517 is now exceeded.

During operation of the transport slide 501 in the direction of the arrow 527, however, the rack 503 is also driven in this direction, and in so doing, urges the gear wheel 504 which is locked at its axis 518 by means of the locking edge 515a engaging the nose 518, in the direction corresponding to the advance direction of the film. By this means, the film is advanced until the feeler 512 enters the next perforation, and in so doing is driven a small distance by the moving film. During this movement of the feeler 512, the projection 512a is pivoted so far that the recess 515b registers with the projection 512a and the lever 515 can now pivot in an anticlockwise direction under the action of the strongly tensioned spring 519, 519a. In this manner, the pivotable arm 508 is unlocked. Also, since film transport has been completed, the gearwheels 504 and 505 are effectively blocked by the frictional resistance to movement of the film in the cartridge and/or the frictional resistance to movement inherent in the gear system. Consequently, when the slide 501 and the rack 503 are moved further in the direction of the arrow 527, the gearwheels 507, 505 and hence 504 not being able to rotate about their own axes, the gearwheel 504 is instead displaced laterally, so pivoting the arm 508 about the axis 509. This disengages the drive connection to the film spool. The arm 508 is of course spring biased to the drive connection position and so the wheel 504 rides over the teeth of the rack 503 and remains in contact therewith. When the direction of movement of the slide 501 is reversed, the gearwheel 504 rides over the teeth of the rack 503 on the other side of the drive connection position. The transport path of the slide 501 is, however, so fixed that the gear wheel 504 remains in contact with the rack 503 and meshed with the gear wheel 505.

When the film transport is complete, the slide 501 is moved back into its starting position again. If the release mechanism 526 is

now actuated, the shutter drive means 524 operates, actuating the shutter plate 525. Accordingly, the pawl 523 and the control lever 520 are also displaced, with the result that the pin 520a slides away from the spring 519, and the spring is relaxed. Thus, the spring 517 is now stronger and can become effective and can move the locking lever 515 back into the locking position of the pivotable arm 508, 518, with the result that, because of the complete locking of the pivotable arm 508, when the film transport slide 501 is actuated again, the film is again advanced by way of the rack 503. After a first short section of this new film transport operation, the feeler 512 is lifted out of the perforation at the inclined surface 531, and springs back into the position shown in the figure, so that the process already described can begin again.

Of course, other embodiments are also possible that are not shown for the sake of simplicity. For example, it is also possible for an impact device for impact-ignitable flash lamps or a piezo-electric crystal to be tensioned by the transport slide, upon which device the control of the locking lever 520 may depend. In place of the lever-spring arrangement 520, 519, it would also be possible to have a lever or cam-gear system for control of the locking lever 515.

WHAT WE CLAIM IS:

1. A still camera for use with roll film having a perforation associated with each frame, which camera comprises a feeler arranged to engage a perforation at the end of film transport, a film transport control, a mechanism for transmitting force from the transport control to a film spool in the camera, which mechanism includes a gearwheel, an arm on which the gearwheel is rotatably mounted and which is pivotable to displace the gearwheel to disengage the drive from the transport control to the spool, and a locking member, the feeler being so interconnected with the locking member that when the feeler is disengaged from a perforation during film transport, the locking member holds the arm in the position where there is a drive connection from the transport control to the film spool, and when the feeler engages a perforation at the end of film transport, it is arranged to cause the locking member to release the arm to permit its movement to a position where the drive to the film spool is disengaged.

2. A camera as claimed in claim 1, wherein there is provided a projection on the pivotable arm, against which the locking member bears to lock the arm in the drive connection position.

3. A camera as claimed in claim 2, wherein the projection is centred on the axis of the gear wheel.

4. A camera as claimed in any one of 130



turned back by the force of a spring secured to it. The shutter drive means 524 may be locked in its tensioned position by the engagement of the pin joining it to the pawl 523 behind the lug on the release 526. Other kinds of shutters can of course be employed to displace the lever 523.

In the course of the shutter tensioning, the control lever 520 is driven in a clockwise direction by means of the hook 523, which is under the action of a lightly tensioned spring 528 and which slides along a pin 529. This causes a pin 520a on the lever 520 to press on the spring 519 and tension it. The arm 519a of the spring 519 therefore urges the locking lever 515 to rotate in an anti-clockwise direction, since the force of the spring 517 is now exceeded.

During operation of the transport slide 501 in the direction of the arrow 527, however, the rack 503 is also driven in this direction, and in so doing, urges the gear wheel 504 which is locked at its axis 518 by means of the locking edge 515a engaging the nose 518, in the direction corresponding to the advance direction of the film. By this means, the film is advanced until the feeler 512 enters the next perforation, and in so doing is driven a small distance by the moving film. During this movement of the feeler 512, the projection 512a is pivoted so far that the recess 515b registers with the projection 512a and the lever 515 can now pivot in an anticlockwise direction under the action of the strongly tensioned spring 519, 519a. In this manner, the pivotable arm 508 is unlocked. Also, since film transport has been completed, the gearwheels 504 and 505 are effectively blocked by the frictional resistance to movement of the film in the cartridge and/or the frictional resistance to movement inherent in the gear system. Consequently, when the slide 501 and the rack 503 are moved further in the direction of the arrow 527, the gearwheels 507, 505 and hence 504 not being able to rotate about their own axes, the gearwheel 504 is instead displaced laterally, so pivoting the arm 508 about the axis 509. This disengages the drive connection to the film spool. The arm 508 is of course spring biased to the drive connection position and so the wheel 504 rides over the teeth of the rack 503 and remains in contact therewith. When the direction of movement of the slide 501 is reversed, the gearwheel 504 rides over the teeth of the rack 503 on the other side of the drive connection position. The transport path of the slide 501 is, however, so fixed that the gear wheel 504 remains in contact with the rack 503 and meshed with the gear wheel 505.

When the film transport is complete, the slide 501 is moved back into its starting position again. If the release mechanism 526 is

now actuated, the shutter drive means 524 operates, actuating the shutter plate 525. Accordingly, the pawl 523 and the control lever 520 are also displaced, with the result that the pin 520a slides away from the spring 519, and the spring is relaxed. Thus, the spring 517 is now stronger and can become effective and can move the locking lever 515 back into the locking position of the pivotable arm 508, 518, with the result that, because of the complete locking of the pivotable arm 508, when the film transport slide 501 is actuated again, the film is again advanced by way of the rack 503. After a first short section of this new film transport operation, the feeler 512 is lifted out of the perforation at the inclined surface 531, and springs back into the position shown in the figure, so that the process already described can begin again.

Of course, other embodiments are also possible that are not shown for the sake of simplicity. For example, it is also possible for an impact device for impact-ignitable flash lamps or a piezo-electric crystal to be tensioned by the transport slide, upon which device the control of the locking lever 520 may depend. In place of the lever-spring arrangement 520, 519, it would also be possible to have a lever or cam-gear system for control of the locking lever 515.

WHAT WE CLAIM IS:

1. A still camera for use with roll film having a perforation associated with each frame, which camera comprises a feeler arranged to engage a perforation at the end of film transport, a film transport control, a mechanism for transmitting force from the transport control to a film spool in the camera, which mechanism includes a gearwheel, an arm on which the gearwheel is rotatably mounted and which is pivotable to displace the gearwheel to disengage the drive from the transport control to the spool, and a locking member, the feeler being so interconnected with the locking member that when the feeler is disengaged from a perforation during film transport, the locking member holds the arm in the position where there is a drive connection from the transport control to the film spool, and when the feeler engages a perforation at the end of film transport, it is arranged to cause the locking member to release the arm to permit its movement to a position where the drive to the film spool is disengaged.

2. A camera as claimed in claim 1, wherein there is provided a projection on the pivotable arm, against which the locking member bears to lock the arm in the drive connection position.

3. A camera as claimed in claim 2, wherein the projection is centred on the axis of the gear wheel.

4. A camera as claimed in any one of 130

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claims 1 to 3, wherein the pivotable arm is spring-biased into the drive connection position.

5 5. A camera as claimed in any one of claims 1 to 4, wherein the feeler is arranged to be taken along a small distance by the moving film after falling into a perforation, and has a projection which registers with a recess in the locking member after that
10 small movement to permit the movement of the locking member to release the pivotable arm.

6. A camera as claimed in any one of claims 1 to 5, wherein the locking member is
15 under the action of a spring which urges it into the locking position.

7. A camera as claimed in any one of claims 1 to 6, wherein a further member which is connected with a component to be
20 tensioned, and operating during the shutter process and which is in working connection with the locking member is so arranged that the locking member is releasable for pivoting into its locking position when the shutter
25 is in operation or when its operation is complete, and is releasable for pivoting into a position where it does not lock the pivotable arm during the tensioning movement.

8. A camera as claimed in claim 7,
30 wherein the further member includes a spring to be tensioned and untensioned by a control lever, which spring in its tensioned state urges the locking lever out of its locking position.

35 9. A camera as claimed in claim 6 and claim 8, wherein the spring that moves the locking member out of its locking position is stronger than the spring that urges the locking member into its locked position.

40 10. A camera as claimed in any one of claims 1 to 4, wherein the locking member is under the action of first resilient means which urges the locking member into its locking position and second resilient means
45 which urges the locking member in the opposite direction and which is capable of selectively exerting a greater and a lesser

force on the member than the first resilient means.

11. A camera as claimed in claim 10, 50 wherein the second resilient means is tensioned to its greater value during shutter tensioning.

12. A camera as claimed in claim 11, wherein the arrangement is such that the
55 locking member is held in its locking position by the feeler after shutter tensioning.

13. A camera as claimed in claim 12, wherein the feeler is arranged to be taken
60 along a small distance by the moving film after falling into a perforation, and has a projection which registers with a recess in the locking member after that small movement to permit the locking member to move
65 away from its locking position.

14. A camera as claimed in any one of claims 1 to 13, wherein a rack is provided between the film transport control and the
rotatably mounted gear wheel.

15. A camera as claimed in claim 14, 70 wherein a load limit stop spring is arranged between the rack and the film transport control.

16. A camera as claimed in any one of claims 1 to 15, wherein the mechanism
75 includes a gearwheel rotatable about the axis of pivoting of the pivotable arm.

17. A camera as claimed in any one of claims 1 to 16, wherein the arrangement is such that, at the end of film transport, the
80 friction of the film and/or in the mechanism is such that the gearwheel is blocked so that, on further actuation of the control, the gearwheel pivots the pivotable arm to the position where the drive to the film spool is
85 disengaged.

18. A camera substantially as hereinbefore described with reference to, and as shown in, the accompanying drawing.

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