

PATENT SPECIFICATION (11)

1 588 419

1 588 419

- (21) Application No. 32150/77 (22) Filed 1 Aug. 1977 (19)
 (31) Convention Application No. 2 634 384 (32) Filed 30 July 1976 in
 (33) Fed. Rep. of Germany (DE)
 (44) Complete Specification published 23 April 1981
 (51) INT. CL.^a G03B 1/32 17/52
 (52) Index at acceptance
 G2A 201 203 212 216 217 225 C1 LE



(54) STILL CAMERA

(71) We, AGFA-GEVAERT AKTIENGESELLSCHAFT, 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.

It is known to provide, as drive means for driving the means for transporting the film between exposures, either a manually actuated control, for example, a rotary knob, a rapid-wind lever or a slide, or a motor, for example, a clockwork or an electric motor.

It is also known that the drive means requires a different output in different phases of the film transport operation, especially when additional camera functions such as the tensioning of a shutter, the lowering of a mirror or the tensioning of an impact ignition device for a flashlamp are to be derived from the drive means. This has been taken into account in the case of manual transport drive means; motor drive means were designed to produce an output equal to peak loadings, and this meant for example that it was quite possible for them to tear the film out of a cartridge or destroy the perforations when the end of the film was reached.

The problem of varying load over different parts of a transport operation applies particularly to instant picture still cameras, wherein film assemblies are transported out of the camera between two rollers, the developer thereby being spread over the surface of the picture. Thus, at the beginning, the developer sac must be squeezed out, and at the end the developer trap, which like the developer sac produces a thickening in the film assembly, must be surmounted. In addition, a shutter and a flashlamp impact ignition device may also need to be tensioned.

These problems of varying load which have occurred to an increasing extent have hitherto been compensated for—if at all—by regulating the motor speed by switching in additional current sources at peak load, or

by mechanical regulation of the rotation speed.

The invention provides a still camera having means for transporting the film between exposures, a gear mechanism, and drive means for driving the transport means via the gear mechanism, wherein the transmission ratio of the gear mechanism so varies over a film transport operation that, if a substantially constant torque is supplied by the drive means to the gear mechanism, greater torque is applied by the gear mechanism to the film transport means at the beginning, and at the end, of a film transport operation than during an intermediate part of the film transport operation.

With such a camera, sufficient output torque can be developed for peak loads during the film transport operation even with a relatively small input torque. Additional camera functions can be derived from the drive means at the beginning and/or the end of a film transport operation.

The drive means may be manually operated, for example, it may be a wind knob or lever, or a mechanism operated by the opening or closing of the camera; alternatively, the drive means may be a motor. The latter can easily be arranged to supply a substantially constant torque.

The gear mechanism may include a driving wheel and a driven wheel coupled by means of a drive member on the driving wheel that is arranged eccentrically with respect to the axis of the driving wheel.

In one arrangement, the gear mechanism may include two wheels arranged adjacent to each other and having parallel axes of rotation, one wheel having a slot extending in a substantially radial direction and the other wheel having a pin engaging in the slot, the arrangement being such that when one wheel is driven, that wheel drives the other by means of the pin/slot coupling. The wheel that is driven by the other wheel may be provided with teeth, preferably on the periphery, by means of which it drives the film transport means.

In another arrangement, the gear mechanism may include two eccentrically

supported gearwheels meshing with one another, each of which is rigidly connected to a centrally supported gearwheel, one of which is arranged to be driven by the drive means and the other of which is arranged to drive the film transport means.

The camera may be an instant picture camera: the transport means then preferably comprises transport rollers.

10 Instant picture cameras constructed in accordance with the invention will now be described, by way of example, with reference to the accompanying drawings, in which:

15 Figure 1 is a side view, partly in section, of a first instant picture camera according to the invention with a gear mechanism in the position for minimum transmission at the beginning of a film transport operation;

20 Figure 2 shows the gear mechanism shown in Figure 1 in the position for maximum transmission;

Figure 3 is a developed sectional view of the gear train shown in Figures 1 and 2;

25 Figure 4 shows the camera of Figure 1 at the end of a film transport operation;

Figure 5 is a side view, partly in section, of a second instant picture camera;

30 Figure 6 shows a detail of the camera shown in Figure 5 in the maximum transmission phase;

Figure 7 shows an alternative form of the gear mechanism shown in Figures 5 and 6; and

35 Figure 8 is a diagram of the transmission ratios of the respective gear mechanisms of the camera shown in Figures 1 to 7.

Figures 1 to 4 show a first instant picture camera, which is a folding camera.

40 The camera has a housing 1, a folding lens support 2, a lens 3, bellows 4, and two developer rollers 5 and 6 at the top for instant picture film assemblies (not shown). A folding toothed segment fan 7, consisting of sectors 7a and 7b, which are locked with respect to one another by way of a pawl 8, is arranged between the lens support 2 and the housing 1. The toothed crown segment 7c of the fan 7 engages a pinion 9 which is fixed to the camera. The sectors 7a and 7b are in spaced apart but adjacent planes to allow their overlap in the folded camera position (to give a compact arrangement) while presenting a gear segment of approximately the sum of their circumferential lengths to the pinion 9. This arrangement is described in greater detail in the Applicants German Patent Specification No. 26 34 383.9.

55 The pinion 9 in turn engages a centrally supported wheel 10a of a double gear wheel 10. The second wheel 10b of the double gearwheel is rigidly and eccentrically connected to the first wheel 10a. The wheel 10b engages with an eccentrically supported wheel 11b of a second double gearwheel, the second wheel 11a of which is centrally supported

and engages in a pinion mounted on the roller 5. The position of the double gearwheels 10 and 11 relative to one another is such that the extended radius of the eccentric wheel 10b of one double gearwheel has a correspondingly shortened radius of the eccentric wheel 11b of the second double gearwheel associated with it in such a way that the sum of the radii is always constant and equal to the distance between the parallel rotation axes 10c and 11c.

The method of operation of the device described is as follows. When the lens support 2 is moved towards the camera housing 1, the pinion 9 is rotated under the influence of the fan 7 and, by way of the central gearwheel 10a, drives the eccentric wheel 10b of the latter. The eccentric wheel 10b, by way of the eccentric wheel 11b, rotates the central wheel 11a of the double gearwheel 11 and thus the roller 5.

As can be seen from Figure 1, at the beginning of a transport operation the radius a_1 is at first small and b_1 is large; in consequence, with the pinion 9 turning at a constant speed, the roller 5 rotates slowly at first. When the double gearwheels 10 and 11 have turned through 180° , the position shown in Figure 2 is reached. The ratio of a_2 to b_2 is greater than 1; in this region therefore the roller 5 turns faster. When the camera is completely closed (in the position shown in Figure 4), the initial position of the double gearwheels 10 and 11 shown in Figure 1 is reached again. The camera can be opened again without the rollers 5 and 6 rotating due to a freewheel (not shown), and a new transport operation can be carried out.

The approximate relation between the transmission ratio and the angle turned through by the gearwheels a and b is shown as a curve a in Figure 8.

A second instant picture camera according to the invention is shown in Figures 5 to 7. In this embodiment, two gearwheels 20 and 21 which are centrally supported on spindles 20c and 21c are arranged one on top of the other. The spindles are parallel to one another but terminate at the surfaces of the respective gearwheels 20 and 21. The gearwheel 20 meshes with the pinion 9 which is driven by a motor 12 by way of a worm 13, and the gearwheel 21 meshes with the roller 6. Attached to the surface of the gearwheel 20 that faces the gearwheel 21 there is a pin 20a which engages in a radial slot 21a in the gearwheel 21. The slot 21a is at least as long as the distance between the axes of rotation 20c and 21c.

The method of operation of the device is as follows. The pinion 9 drives the gearwheel 20, which in turn drives the gearwheel 21, via the pin 20a and the slot 21a, which in turn drives the roller 6. As can be seen from the drawing, in the starting position shown in

Figure 5 the lever arm *a* acting between the gearwheels 20 and 21 is large; the roller 6 therefore turns slowly. In the position shown in Figure 6, after rotation through 180°, the ratios are reversed; due to the smaller lever arm *b* the transmission is reduced. A transmission ratio therefore occurs again which corresponds to the curve *a* in Figure 8.

Figure 7 illustrates a possible variation of the sliding crank mechanism of Figures 5 and 6, in which the slot 21*b* in the disc 21 is curved. The curvature shown produces a transmission curve as shown in Figure 8 by means of the broken line *b*, which is characterised by having an approximately triangular shape.

By making suitable alterations to the shape and position of the curve, other transmission curves can also be obtained.

The invention is not restricted to the embodiments illustrated. For the sake of clarity, means to tension the shutter or to actuate the gripper which is usual in instant picture cameras have not been shown. In addition, the first embodiment may be motor-driven and the second embodiment manually driven; it is also possible to provide other types of manual operation for the pinion 9.

Other irregularly shaped gears may also be used in the gear mechanism, for example elliptical gearwheels, oval gearwheels, or cam gear mechanisms.

The camera may employ any of the features disclosed in the Applicants' co-pending Application Nos. 18028/77, 18029/77 and 20868/77, Serial Numbers 1,582,852, 1,582,554, 1,583,591.

WHAT WE CLAIM IS:—

1. A still camera having means for transporting the film between exposures, a gear mechanism, and drive means for driving the transport means via the gear mechanism, wherein the transmission ratio of the gear mechanism so varies over a film transport operation that, if a substantially constant torque is supplied by the drive means to the gear mechanism, greater torque is applied by the gear mechanism to the film transport means at the beginning, and at the end, of a film transport operation than during an intermediate part of the film transport operation.

2. A camera as claimed in claim 1, wherein the gear mechanism includes a driving wheel and a driven wheel coupled by means of a drive member on the driving wheel that is arranged eccentrically with respect to the axis of the driving wheel.

3. A camera as claimed in claim 1, wherein the gear mechanism includes two wheels arranged adjacent to each other and having parallel axes of rotation, one wheel having a slot extending in a substantially radial direction and the other wheel having a pin engaging in the slot, the arrangement being such that when one wheel is driven, that wheel drives the other by means of the pin/slot coupling.

4. A camera as claimed in claim 3, wherein the wheel that is driven by the other wheel is provided with teeth, by means of which it is arranged to drive the film transport means.

5. A camera as claimed in claim 1, wherein the gear mechanism includes two eccentrically supported gearwheels meshing with one another, each of which is rigidly connected to a centrally supported gearwheel, one of which is arranged to be driven by the drive means and the other of which is arranged to drive the film transport means.

6. A camera as claimed in any one of claims 1 to 5, wherein the camera is an instant picture camera and the transport means comprises transport rollers for the instant picture film assemblies, and wherein, in use, the developer sac of the instant picture film assembly is squeezed out by the rollers at the beginning of a transport operation and the developer trap of the film assembly is surmounted by the rollers at the end of the transport operation.

7. A camera substantially as hereinbefore described with reference to, and as shown in, Figures 1 to 4, or Figures 5 and 6, or Figure 7 of the accompanying drawings.

ABEL & IMRAY,
Chartered Patent Agents,
Northumberland House,
303—306 High Holborn,
London, WC1V 6LH.



Figure 5 the lever arm *a* acting between the gearwheels 20 and 21 is large; the roller 6 therefore turns slowly. In the position shown in Figure 6, after rotation through 180°, the ratios are reversed; due to the smaller lever arm *b* the transmission is reduced. A transmission ratio therefore occurs again which corresponds to the curve *a* in Figure 8.

Figure 7 illustrates a possible variation of the sliding crank mechanism of Figures 5 and 6, in which the slot 21*b* in the disc 21 is curved. The curvature shown produces a transmission curve as shown in Figure 8 by means of the broken line *b*, which is characterised by having an approximately triangular shape.

By making suitable alterations to the shape and position of the curve, other transmission curves can also be obtained.

The invention is not restricted to the embodiments illustrated. For the sake of clarity, means to tension the shutter or to actuate the gripper which is usual in instant picture cameras have not been shown. In addition, the first embodiment may be motor-driven and the second embodiment manually driven; it is also possible to provide other types of manual operation for the pinion 9.

Other irregularly shaped gears may also be used in the gear mechanism, for example elliptical gearwheels, oval gearwheels, or cam gear mechanisms.

The camera may employ any of the features disclosed in the Applicants' co-pending Application Nos. 18028/77, 18029/77 and 20868/77, Serial Numbers 1,582,852, 1,582,554, 1,583,591.

WHAT WE CLAIM IS:—

1. A still camera having means for transporting the film between exposures, a gear mechanism, and drive means for driving the transport means via the gear mechanism, wherein the transmission ratio of the gear mechanism so varies over a film transport operation that, if a substantially constant torque is supplied by the drive means to the gear mechanism, greater torque is applied by the gear mechanism to the film transport means at the beginning, and at the end, of a film transport operation than during an intermediate part of the film transport operation.

2. A camera as claimed in claim 1, wherein the gear mechanism includes a driving wheel and a driven wheel coupled by means of a drive member on the driving wheel that is arranged eccentrically with respect to the axis of the driving wheel.

3. A camera as claimed in claim 1, wherein the gear mechanism includes two wheels arranged adjacent to each other and having parallel axes of rotation, one wheel having a slot extending in a substantially radial direction and the other wheel having a pin engaging in the slot, the arrangement being such that when one wheel is driven, that wheel drives the other by means of the pin/slot coupling.

4. A camera as claimed in claim 3, wherein the wheel that is driven by the other wheel is provided with teeth, by means of which it is arranged to drive the film transport means.

5. A camera as claimed in claim 1, wherein the gear mechanism includes two eccentrically supported gearwheels meshing with one another, each of which is rigidly connected to a centrally supported gearwheel, one of which is arranged to be driven by the drive means and the other of which is arranged to drive the film transport means.

6. A camera as claimed in any one of claims 1 to 5, wherein the camera is an instant picture camera and the transport means comprises transport rollers for the instant picture film assemblies, and wherein, in use, the developer sac of the instant picture film assembly is squeezed out by the rollers at the beginning of a transport operation and the developer trap of the film assembly is surmounted by the rollers at the end of the transport operation.

7. A camera substantially as hereinbefore described with reference to, and as shown in, Figures 1 to 4, or Figures 5 and 6, or Figure 7 of the accompanying drawings.

ABEL & IMRAY,
Chartered Patent Agents,
Northumberland House,
303—306 High Holborn,
London, WC1V 6LH.