

# PATENT SPECIFICATION

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## (54) FILM HANDLING APPARATUS WITH RECEPTION CHAMBER FOR SOUND AND SILENT FILM

(71) We, KARL VOCKENHUBER of 118 Pötzleinsdorferstrasse, Vienna 18, Austria, and RAIMUND HAUSER, of 2 Goldeggasse, Vienna 4, Austria, both Austrian Citizens, 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 cine camera.

According to the present invention, there is provided a cine camera for use with sound film contained in a sound film cartridge, comprising means defining a cartridge compartment; a sensing device extending into the compartment for determining whether a sound film cartridge has been inserted and having a first condition without a sound film cartridge in the compartment and a second condition with a sound film cartridge inserted; and sound recording means, the sound recording means including guide means for the film including a capstan for driving the film, at least one sound head, and pressure means for pressing the film at least against the capstan of the guide means, the pressure means and the capstan having at least two relative positions, in the first position they are spaced one from another for enabling insertion of the film therebetween, in the second position at least one of them is displaced towards the other in comparison with the first position; activating means controlled by the sensing device for enabling relative displacement of the pressure means and the capstan from the first into the second position, in the first condition of the sensing device the pressure means and the capstan assuming the first position, in the second condition of the sensing device the pressure means and the capstan being enabled to assume the second position.

Cinema cameras are known which are adapted to control devices such as a spool

transport motor in dependence on the loading with a certain film cassette. One camera of this kind can be loaded with cassettes containing 10 m spools or cassettes containing 30 m spools. Since the 30 m spool cassette has its own motor it must also be possible for this motor to be switched on by a camera release. To this end the camera is provided with contact surfaces in the zones to which the 30 m spool cassette is attached, the camera motor for the 10 m spool cassette being connected to the battery when the contacts are open while with the contacts closed, more particularly with the contacts connected to electric plug couplings of the 30 m spool cassette, the cassette motor is connected to the battery. The camera motor will then be inoperative.

The invention will now be described in more detail, by way of examples, with reference to the accompanying drawings, in which:—

Figure 1 is a side view, partially broken away, of a film camera having a cassette reception chamber in which is located a sound film cassette shown cooperating with tracers which sense the cassette casing;

Figure 2 shows a part of a cassette reception chamber modified to respond to the external shape of a cassette then fitted therein by modifying connections inside the apparatus to make them suitable for the film loaded in the cassette;

Figure 3 is a fragmentary view of Figure 2 as viewed from the left in that Figure;

Figure 4 shows one way of controlling the spacing between a pinch roller and a sound spindle in accordance with the external contour of a cassette fitted in the reception chamber;

Figure 5 is a plan view of Figure 4;

Figure 6 shows the arrangement of Figure 4 as viewed from the left hand side;

Figure 7 shows a governor control circuit for a motor;

Figure 8A is a scrap view of a mechanism incorporated in the outside wall of a

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cassette reception chamber and which controls approach movement of a pinch roller to a capstan in accordance with the type of cassette inserted in the chamber and operation of a mode switch on the apparatus;

Figure 8B is a top plan view of Figure 8A;

Figure 9 shows an alternative arrangement of producing approach movement of a pinch roller to a capstan to that shown in Figures 8A and 8B;

Figure 10 shows a second arrangement for serving the same purpose;

Figure 11 shows yet a further arrangement for controlling the approach movement of a pinch roller to a capstan in accordance with the sensed profile of a film cassette loaded in the cassette reception chamber;

Figure 12 is a view of part of Figure 11 as seen from the right to explain operation of a toggle linkage.

The bulk of the drawings will be recognised as being diagrammatic. Corresponding parts serving the same purpose in different drawings bear the same reference numerals, even though the embodiments of which they form part are different from one another. Likewise, although in the case of many of the embodiments complete structural details of the apparatus are omitted to prevent overloading the drawings, it will be understood that such parts are there and operate in a manner well known in the art.

A camera 18 is illustrated in Figure 1 having a cassette reception space 4 provided with tracing means 47 adapted to detect the presence of a sound film cassette 2. Figure 2 shows the construction in detail of a tracing device. The cassette reception space 4 is provided on its underside with a movable bottom plate 25 which is guided in side walls 26, 27 of the reception space 4. Springs 28 maintain the plate 25 in the illustrated position which is also assumed when a silent film cassette is inserted into the space 4 (as is illustrated in dash-dotted lines in Figure 1). Levers 31, 42 which are pivotable about axes 29, 30 that are fixed in relation to the apparatus and bear resiliently on the rear of the bottom plate 25 remain in the position illustrated in Figure 2. The lever 31 is associated via a pin 33 with a slide 32 which is slidable on one casing wall 34 of the camera 18 in the zone of a socket 35 for an external microphone. When a silent film cassette is inserted the slide 32 covers an aperture 36 in the housing wall 34 thus preventing the insertion of a plug 37 (Figure 1) for the microphone into the socket 35. Part of the slide 32 is constructed as an indicating device, one image 38 shown in Figure 3

appearing in silent film operation and one image 39 appearing in sound film operation in a window 40 which is adjacent to the socket 35.

If a sound cassette 2 is inserted into the camera 18 it will depress the bottom plate 25 against the springs 28 shown in Figure 2. The lever 31 pivots in the clockwise direction and moves the slide 32 into a position in which an aperture 41, that is provided on the slide 32, is in alignment with the aperture 36 thus enabling the microphone plug 37 to be connected to the socket 35. Sound film operation is likewise indicated by the image 39 which is moved into the window 40.

The second lever 42 which also bears resiliently on the underside of the bottom plate 25 is pivoted in the anti-clockwise direction about the axis 30 during the traversing upward motion of the slide 32 in Figure 2. This closes a switch 43 which is adapted to switch on, for example, an amplifier 44 for a sound recording device. The sound recording device in the illustrated example comprises a sound recording lamp 45 but this function could also be performed by the magnetic head 46 as illustrated in Figure 1. The sound recording device could also be directly switched on.

The camera of Figure 1 in which the tracing device comprises two tracers 47 in the limiting zone of the two cassettes utilizes a sound roller, shown but not referenced, in the form of a serrated drum, but this can be replaced in accordance with the invention by a system according to Figures 4 to 6 which only shows the parts required to understand the system. The tracers 47 of which only one is shown are again provided. The tracer 47 is disposed in a corner of a cassette wall 48 which has been omitted from Figure 4 for the sake of clarity. A lever 49 bears under the action of a relatively strong spring on the rear of the tracer 47. The tracer 47 which extends through an opening 51 of the wall 48 is prevented from dropping out by an angled portion 52. The lever 49 is disposed on a spindle 53 on which a relatively short lever 54 is also mounted and is adapted to project in the forward direction through an opening in the wall 48.

A conventional capstan 55 on which a flywheel mass can be mounted behind the wall 48 in conventional manner is provided in place of the sound roller of Figure 1. The capstan 55 cooperates with a pinch roller 56 which is supported on a lever 57 that is pivotable about an axis 58. The lever 57 is loaded by a spring 59 in the sense of thrusting the roller 56 against the capstan 55 but the action of the spring 59 is less than that of the spring 50 (or of both springs 50

because the tracers 47 are provided in pairs according to Figure 1).

The lever 57 is provided with an eye, in a portion 60 thereof, through whose opening the lever 54 extends. Normally both tracers 47 are thrust by the springs 50 into the cassette chamber, the springs 50 overcoming the force of the spring 59 so that the pinch roller 56 is lifted off the sound spindle 55. However, if a cassette 2 is inserted into the camera 18 the cassette thrusts against both tracers 47, the levers 49, 54 are pivoted in a direction such that lever 57 pivots in the anticlockwise direction (Figure 4) under the action of the spring 59 so that the pinch roller 56 bears upon the capstan 55.

The arrangement of the tracers 47 in the manner illustrated in Figure 1 is particularly advantageous because it also assists in providing better retention for a silent film cassette.

A further embodiment is illustrated in Figure 7. It is known that the tape of a tape recorder is driven by a speed-stabilized motor which is advantageously also associated with a speed governor. A motor 20 of this kind for the capstan 55 is illustrated diagrammatically in Figure 1. In silent film operation this motor 20 would not be engaged with the film so that the film is driven exclusively by the claw 8. The claw 8 is associated with a motor 62, the indexing frequency of the claw being maintained constant by a centrifugal governor 63. The position of the governor 63 illustrated in Figure 7 corresponds to silent film operation, the motor 62 being connected via the terminals 64, 65 to a voltage source which is not shown. A switch 66 cooperates with the centrifugal governor 63 in known manner so that the motor circuit is interrupted in the event of an excess motor speed until the nominal speed is again restored. Interruption is provided by a nose 67 disposed on the centrifugal governor 63 and adapted to operate with the switch part 66b.

In sound film operation the film is additionally driven by the motor 20. Since this motor operates at a constant speed as already mentioned it follows that any additional speed regulation of the motor 20 would have a detrimental effect on the running of the film. Accordingly, the cassette tracer 47 connects also a further regulating device 68 for the motor 62 in place of the regulating device 63. The regulating device 63 is switched off simply by the regulating range being set to a speed which is never reached in operation. To this end an arm 69 of the tracer 47 pivots the switch 66 into a position in which the centrifugal governor 63 would be switched only with a speed above the operating

speed (position of the switch 66 in Figure 7 shown in dotted lines). A further arm 70 of the cassette tracer 47 additionally operates a selector switch 71 through which the regulating device 68 is connected to the motor circuit. The regulating device 68 may be a known tracer adapted to trace the magnitude of the film loop which is formed between the claw 8 and the sound spindle 55, the motor 62 being briefly switched off if the loop is too large. The regulating device 68 may of course also comprise a device adapted to trace, for example, the number of perforations between the claw 8 and the capstan 55. In general however the regulating device 68 will maintain a constant length of film between them.

Figures 8A and 8B show a pinch roller 109 rotatably journaled on a support 143. The support 143 is provided with two guide pins 144 which are guided in control slits 145 that extend parallel with each other so as to prevent pivoting of the support 143. The control slits 145 are provided on a plate 146 which is connected to tracers 147 that extend into the cassette reception chamber 102. If a cassette 2 is correctly inserted into the reception chamber 102 the tracers 147 displace the plate 146 against a spring 148 at right angles to a bulkhead 149 of the cassette reception chamber 102 so that the pins 144 are moved out of the zone of rectilinear parts 150 of the control slits 145. A spring 151 slides the pins 144 along inclined parts of the slits 145. Accordingly, the pinch roller 109 is moved through an opening 152 in the bulkhead 149 into the cassette reception chamber 102 to assume the standby position. At the end of the inclined parts the pins 144 move against a stop slide 153 associated with a mode selector switch (not shown).

To operate the camera the stop slide 153 is moved to the left. This allows the pins 144 to continue their travel along the inclined parts of the slits to the terminal parts 154 of the slits. This brings the pinch roller 109 against the capstan 108 (not shown) to commence sound recording.

The apparatus shown in Figure 9 can be loaded with cassettes of different kinds. A tracer 155 is disposed opposite to a characteristic position of the cassette for which engagement of the sound spindle with a pinch roller is to take place.

On the insertion of the cassette 2 the tracer 155 is displaced from the reception chamber 102 and engages a lug 156 to pivot a lever 157 in the anti-clockwise direction. At the end opposite to the lug 156 the lever 157 is provided with a slit 158 in which a pin 159 of the spindle 115 for the pinch roller 109 is guided. Pivoting the lever in the anti-clockwise direction causes the pinch roller 109 to ride up the opening 152 into the

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reception chamber 102 and comes to rest under the film F, in the standby position.

Rotating the lever 157 simultaneously releases a lock 160 for a cassette retaining means 161 which then thrusts the cassette 2 against the bulkhead 149 with the force exerted by a spring 162.

If a mode selector switch, not shown, is then operated a lever 163 slides upwardly against the force exerted by a spring 164. Since the lever 163 also represents the bearing system of the pinch roller spindle 115 the latter will be displaced along the slit 158 so that the pinch roller 109 comes into frictional contact with the film F so that the driving torque from the driven capstan 108 is transmitted to the film F. After the mode selector switch is again released the pinch roller 109 returns to the standby position. A slide 165, which projects from the camera casing, opens the cassette retaining device 161 and re-engages the lock 160 prior to removal of the cassette 2. The pinch roller 109 is disengaged from the capstan 108 automatically by the removal of the cassette 2, as this allows a spring 155a to bias the tracer 155 to the position shown in Figure 9.

Figure 10 discloses an embodiment in which the opening between the pinch roller and the capstan is particularly wide when they are in their inoperative positions thus greatly facilitating the insertion of the cassette 2 or the insertion of the film F. In the reception chamber for the cassette 2 is provided a tracer 155 which cooperates with a lug 156' of a lever 157'. The lever 157' is again pivotable about an axis 166 but is constructed in angular form and retains the pinch roller 109, located in the cassette chamber 102, in a position spaced from and inclined with respect to the capstan 108. The opening into which the film F is to be inserted between the capstan 108 and the pinch roller 109 is therefore particularly large.

After the cassette 2 is inserted the lever 157' assumes the position indicated in broken lines in Figure 10. The lever 157' is pivoted to this standby position against the action of a hairpin spring 167'. The shaft 166 is fixed on a slide bar 168 which is associated with the method selector switch. The pinch roller 109 is brought against the capstan 108 by sliding upward movement of the slide bar 168. To prevent the pinch roller 109 being lifted off the capstan during operation, the lug 156' has a sufficient length to bear on the tracer 155 as long as the cassette 2 is in the chamber. The cassette 2 is advantageously thrust against the tracer 155 by a spring which is not shown in order to retain the tracer in a fixed position. A locking device for holding the

pinch roller against the capstan can of course also be provided.

Any part which is moved when the apparatus assumes its operation condition, e.g. the claw or a film take-up, can be used to displace the pinch roller from its standby position to its operating or third position at which it presses the film against a capstan, but under the additional control of the tracers 47, 147 or 155 respectively.

According to Figure 11 a cassette tracer 386 is provided and is retained by a compression spring 387 in a reception chamber of the film camera. The tracer 386 displaces a control groove 388 into which a pin 389 engages. If no cassette is disposed in the reception chamber of the camera the pin 389 bears on the end of the control groove 388 which is at the right hand upper end in Figure 11. A slide 390 that supports the pin 389 is jointed at the opposite end to a double armed lever 391 shown more clearly in Figure 12. The lever 391 is pivotable about the same axis 377 as a lever 370 carrying the pinch roller 109, and is loaded by a spring 392 in such a way that the action of the compression spring 387 is assisted by the spring 391, i.e. the slide 390 is biased upwards. Since the tracer 389 and therefore the slide 390 are on their upper limiting position in the absence of a cassette, a point 393 at which the spring 376 acts and which coincides with the joint between the double armed lever 391 and the slide 390, is situated at a level above the pivoting point 377 of the lever 370 as shown in broken outline. The lever 370 which supports the pinch roller 109 is then raised off the hook 372 into a threading-up position.

If the cassette 2 is inserted into the camera 101 the tracer 386 is displaced to the right — with reference to Figure 11 — thus initiating the downward motion of the slide 390 which is constrained to move vertically. The downward movement produces clockwise pivoting of the double armed lever 391 against the force exerted by the spring 392. The point 393 at which the spring 376 acts is then disposed below the pivoting point 377 and biases the lever 370 towards the capstan 108 and to a standby position where it is held by the hook 372. The film drive can be started after releasing the lever 370 from engagement with the hook 372.

In principle it would be possible to operate without the double armed lever 391. However, the use of the lever has the advantage that the control groove 388 is not subjected to excessive wear because it is simpler to control the contact pressure between the pin 389 and the groove 388 by a linkage rather than by a spring which acts directly on the pin 389.

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WHAT WE CLAIM IS:—

1. A cine camera for use with sound-film contained in a sound-film cartridge, comprising means defining a cartridge compartment; a sensing device extending into the compartment for determining whether a sound-film cartridge has been inserted and having a first condition without a sound-film cartridge in the compartment and a second condition with a sound-film cartridge inserted; and sound-recording means, the sound recording means including guide means for the film, at least one sound-head, and pressure means for pressing the film at least against the capstan of the guide means, the pressure means and the capstan having at least two relative positions, in the first position they are spaced one from another for enabling insertion of the film therebetween, in the second position at least one of them is displaced towards the other in comparison with the first position; activating means controlled by the sensing device for enabling relative displacement of the pressure means and the capstan from the first into the second position, in the first condition of the sensing device the pressure means and the capstan assuming the first position, in the second condition of the sensing device the pressure means and the capstan being enabled to assume the second position.

2. A cine camera as claimed in claim 1 wherein the activating means comprise support means on which the pressure means are mounted and a control mechanism operatively connecting the sensing device with the support means.

3. A cine camera as claimed in claim 2, wherein the control mechanism comprise releasable locking means for locking the support means in the first position of the pressure means with the sensing device being in the first condition and for releasing the support means to be displaced into the second position with the sensing device being in the second condition.

4. A cine camera as claimed in claim 1, wherein the sound-recording means

comprise at least one sound-recording circuit also controlled by the sensing device.

5. A cine camera as claimed in claim 2, wherein the control mechanism comprises cam means controlling the displacement of the support means.

6. A cine camera as claimed in claim 1, further comprising mode selector switch means for the camera having at least a run mode position for driving the film and an inoperative position and being connected to means for preventing displacement of the sound-recording means in the direction of engagement with each other with the mode selector switch means being in inoperative position, but allowing displacement with the mode selector switch means being in run mode position.

7. A cine camera as claimed in claim 2, wherein the control mechanism comprises a toggle mechanism including spring means biasing the support means alternatively in one of two opposite directions, in the first condition of the sensing device the spring means biasing the support means into its first position, in the second condition of the sensing device the spring means biasing the support means into its second position.

8. A cine camera as claimed in claim 1 wherein the pressure means and the capstan have a third relative position, in the second position the pressure means and the capstan being adjacent without firm contact with each other, in the third position the sound recording means having firm contact with each other, the camera further comprising means for controlling the displacement of the sound recording means between the second and the third position.

9. A cine camera as claimed in claim 1, substantially as herein described with reference to any of the embodiments illustrated in the accompanying drawings.

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