

PATENT SPECIFICATION

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(54) CINE CAMERAS

(71) We, AGFA-GEVAERT AKTI-
 ENGESELLSCHAFT, 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 present invention relates to cine
 cameras, and especially to those which are
 provided with variable focal length (zoom)
 lenses.

Such cine cameras can be readily manipu-
 lated by skilled photographers. However, if
 a cine camera having a zoom lens is to be
 used by several persons, for example by
 several members of a family, one or more
 persons are likely to be incapable of properly
 manipulating one or more adjusting elements
 whose manipulation is familiar to the other
 person or persons. Thus, the husband and/or
 the wife might not encounter any problems
 in connection with the manipulation of a cine
 camera which is equipped with a zoom lens
 but the child or children might not be
 familiar with the purpose and/or best mode
 of adjusting the zoom lens under different
 circumstances. This can result in the making
 of unsatisfactory exposures or is likely to
 deter one or more members of the family
 from using the camera. By way of example,
 a mother who has no filming experience is
 often confronted with a situation where she
 could make exceptional shots of her children
 but for the fact that the cine camera which
 can be readily manipulated by the father is
 too complex for proper manipulation by a
 person who has no filming experience.

The invention provides a cine camera
 having a lens of variable focal length, and
 a manually operable control movable be-
 tween first and second positions, wherein, in
 response to movement of the control from
 the first position to the second and back to
 the first, the lens is set to a predetermined
 focal length at least by the completion of
 that movement, irrespective of the focal
 length setting prior to that movement of the
 control.

The manipulation of the camera in the
 predetermined position is simplified without
 unduly affecting the quality of the exposure.
 The means for setting the lens to the pre-
 determined position can be light, not costly,
 and can take up little space. The normal
 operation of the camera need not be affected
 by the provision of those means.

Advantageously, the lens has focussing
 means, and, in response to movement of the
 control from the first position to the second
 position, and back to the first, the focussing
 means is set to a predetermined setting at
 least by the completion of that movement,
 irrespective of the focussing setting prior to
 that movement of the control.

It will generally be found convenient for
 the lens to be set to the predetermined focal
 length and focussing in response to move-
 ment of the control from the first position
 to the second position, but it is possible for
 the lens to be set to the predetermined focal
 length and focussing on the return stroke
 of the control: all that matters, however, is
 that the setting takes place by the completion
 of movement from the first position to the
 second position and back to the first position.

The manual control may be moved from
 the first to second positions and back by

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depression, pulling, pushing, or pivoting of the control. The first position may be a rest position and the second a fully depressed position. It will be appreciated that the second position need not be a definite, fixed position; for example the second position may simply be a (variable) position at which increased friction comes into play. The manual control can be a rotary wheel, a rotary disk, a reciprocable slide, a reciprocable pusher or a pivotable lever; the manual control may be movable between first and second positions at right angles to the optical axis of the zoom lens, or parallel to the optical axis (for example, it may be pushed forward by the thumb), or in a rotary path.

The controls on the camera for adjusting the focal length and for focussing on an object may be mounted on the barrel of the lens, for example, they may be formed by rotatable collars.

The predetermined focal length and focussing may be at an end position of the ranges over which they are variable, or an intermediate position.

Advantageously, a first driven member is movable to vary the focussing of the lens, and a second driven member is movable to vary the focal length of the lens, and there is provided a pair of jaws so coupled to the control that, when the control is in the first position, the jaws are open and the driven members are located between the jaws whatever the focal length and focussing set and, when the control is moved from the first position to the second position, the jaws close and thereby drive the driven members to positions corresponding to the said predetermined focal length and focussing.

Advantageously, a first driven member and a second driven member are movable in a rotary direction about a common axis to vary the focussing of the lens and to vary the focal length of the lens, respectively, and there is provided a pair of rotary members movable about the common axis, the rotary members being so coupled to the control that, when the control is in the first position, the rotary members are spaced apart and the driven members lie between them whatever the focal length and focussing set and, when the control is moved from the first position to the second position, the rotary members move together and thereby drive the driven members to positions corresponding to the said predetermined focal length and focussing.

Advantageously, the lens is set to settings of focal length and focussing that lie at ends of the respective ranges over which the focal length and focussing are variable, in response to movement of the control from the first to the second position, and is set to the predetermined focal length and focussing during the return movement of the control

from the second position to the first position. Preferably, there is provided a mobile driving member capable of being moved by the manual control, a first gear for moving a first driven member to vary the focussing of the lens, a second gear for moving a second driven member to vary the focal length of the lens, a further gear rotatable by the driving member, and clutch means interposed between the further gear and the first and second gears to allow relative movement between the further gear and each of the first and second gears if the lens is at the end settings of focal length or focussing before the manual control has reached the second position. This enables two different predetermined focal lengths and/or focussing to be provided, by arranging that the driving member engages the further gear or an additional gear. For example, the camera can be arranged to focus on different distances, depending on whether the camera is used outdoors (where, for example, focus on a distance of around 5 metres gives a sufficient depth of field) or indoors (where subjects will typically be nearer and, since apertures will generally be larger, the depth of field will generally be smaller); here focus on around 4 metres gives a more appropriate depth of field.

Advantageously, there is provided flexible elements respectively coupled to members movable to vary the focal length and focussing of the lens, and the manual control is operative to move the flexible elements lengthwise when moving from the first to the second position.

Advantageously, the manual control is movable in parallelism with the optical axis of said lens. Preferably, the motion parallel to the optical axis is converted to motion perpendicular to the optical axis by means of a rack parallel to the optical axis on the manual control and a rack perpendicular to the optical axis, the racks lying in parallel planes and being connected by gears. Preferably, a first driven member is movable to vary the focussing of the lens, and a second driven member is movable to vary the focal length of the lens, and there is provided a pair of jaws so coupled to the control that, when the control is in the first position, the jaws are open and the driven members are located between the jaws whatever the focal length and focussing set and, when the control is moved from the first position to the second position, the jaws close and thereby drive the driven members to positions corresponding to the said predetermined focal length and focussing. Advantageously, there is provided resilient means for biasing the lens to the predetermined focal length and focussing, braking means for allowing the lens to be set to, and maintained at, a desired focal length and focussing,

respectively, the braking means overcoming the bias of the resilient means, and the manual control is operable to release the braking means in response to movement of the second position to cause the lens to assume the predetermined focal length and focussing under the action of the resilient means.

Advantageously, there is provided a source of electrical energy, switch means in circuit with said source, and means for closing the switch means in response to movement of the manual control to the second position.

The camera is preferably for narrow gauge film, for example, 8 mm. or Super 8.

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

Figure 1 is a schematic front elevational view of a portion of a cine camera with a zoom lens which embodies the invention;

Figure 2 is a side elevational view of the zoom lens, substantially as seen in the direction of arrow II in Figure 1;

Figure 3 is an exploded perspective view of a portion of a modified zoom lens;

Figure 4 is a partly schematic front elevational view of a third zoom lens;

Figure 5 is a front elevational view of a further cine camera with a zoom lens;

Figure 6 is a perspective view of a further embodiment;

Figure 7 shows the structure of Figure 6 but with the manual control in the second position;

Figure 8 is a fragmentary perspective view of a further zoom lens;

Figure 9 is an enlarged sectional view of a slight modification of the zoom lens of Figure 8;

Figure 10 is a smaller-scale view of certain component parts in the structure of Figure 9;

Figure 11 is a perspective view of a further zoom lens;

Figure 12 is a perspective view of a further zoom lens;

Figure 13 is a perspective view of a modification of the zoom lens shown in Figure 12;

Figure 14 is a fragmentary diagrammatic view of a further cine camera; and

Figure 15 is a fragmentary sectional view substantially as seen in the direction of arrows from the line XV-XV of Figure 14.

Referring to Figures 1 and 2, there is shown a portion of a cine camera having a zoom lens 1. The zoom lens 1 includes a barrel 1a for optical elements 1b, a first adjusting element 2 which is a focusing collar rotatably mounted on the barrel 1a of the lens 1 and having a driven projection or pin 2a, and a second adjusting element 3 which is a zooming collar (that is, for changing the focal length of the lens) rotatably mounted on the barrel of the lens 1

and having a drive projection or pin 3a. The collars 2 and 3 are rotatable between two end positions (in which their projections 2a, 3a respectively assume the positions shown at 2a, 3a and the positions 2a', 3a' and through a plurality of intermediate positions including predetermined ones indicated at 2a'', 3a''). For example, the positions 2a, 3a may correspond to those of infinity and of maximum focal length, the positions 2a' and 3a' may correspond to those of in focus at a minimum distance from the subject and of minimum focal length, and the positions 2a'', 3a'' may represent in focus at a medium distance (e.g., 5 meters) from the subject and a medium focal length.

The projections 2a, 3a are to assume the predetermined positions 2a'' and 3a'' when the camera is to be manipulated by a novice. The predetermined positions 2a'', 3a'' can be readily selected in such a way that a person using the camera is capable of making satisfactory exposures in day-light, the depth of field being acceptable irrespective of the distance of lens 1 from the subject (whether for close-ups or at infinity), as well as of making acceptable shots in artificial light.

The camera of Figures 1 and 2 comprises means for rapidly moving the collars 2 and 3 to positions in which their projections 2a, 3a respectively assume the predetermined positions 2a'' and 3a''. To this end, the housing 4 of the camera supports a manually-operable control in the form of a slider 5 which is biased by a helical spring 6 and which is movable by hand (see the arrow 9) against the spring 6 to pivot two drive jaws 7 and 13. The jaws 7, 13 close on the predetermined positions 2a'', 3a'' of the drive projections 2a, 3a. The jaw is pivotally mounted on a fixed shaft 8 and its shorter arm has an elongated slot 7a for a pin 5b of the slider 5. When the slider 5 is depressed in the direction indicated by arrow 9, the pin 5b pivots the jaw 7 clockwise, as viewed in Figure 1, and causes an outwardly-extending entraining lug 7b at the free end of the longer arm of the jaw 7 to move toward the position 7b. The projections 2a, 3a of the collars 2 and 3 are located in the path of movement of the lug 7b (if the angular positions of the collars 2, 3 are such that their projections 2a, 3a are located between the positions shown at 2a, 3a and the positions 2a'', 3a''), so that the lug 7b automatically entrains the projections toward the positions 2a'', 3a''.

The shaft 8 carries a gear 10 which shares the angular movements of the jaw 7 under or against the bias of the spring 6 and meshes with a smaller second gear 12 on a fixed shaft 11. The gear 12 pivots the jaw 12 which has an entraining lug 13a adapted to move the projections 2a, 3a from the positions 2a', 3a' to the positions 2a'', 3a'', if the

projections 2a, 3a happen to be located between the positions 2a', 3a' and 2a'', 3a'' when the user of the camera moves the slider 5 in the direction indicated by arrow 9.

Thus, assuming that the projections 2a and 3a are in the positions shown at 2a, 3a when the user of the camera wishes to rotate the collars 2, 3 to their predetermined positions, the user simply moves (pushes or pulls) the slider 5 in the direction of arrow 9 whereby the spring 6 stores energy and the jaw 7 is pivoted clockwise, as viewed in Figure 1, to move to the position 7''. At the same time, the jaw 7 causes the gears 10 and 12 to pivot the jaw 13 anticlockwise, as viewed in Figure 1, whereby the jaw 13 moves to the position 13''. During such movement, the lug 13a does not engage the projections 2a, 3a; however, the lug 7b entrains these projections from the positions shown at 2a, 3a to the predetermined positions 2a'', 3a''. If the projections 2a, 3a assume the positions 2a', 3a' (or any positions between those shown at 2a', 3a' and 2a'', 3a'') prior to movement of the slider 5, the collars 2, 3 are rotated by the lug 13a when the slider 5 is moved against the opposition of the spring 6. If the projections 2a, 3a are already in the positions 2a'', 3a'' prior to movement of the slider 5 from its rest position, the angular positions of the collars 2 and 3 remain unchanged. It will be seen that the jaws 7 and 13 effect a movement of projections 2a, 3a to the neutral positions 2a'', 3a'' whenever the slider 5 is moved from the rest position of Figure 1 to the other extreme position, that is, the fully depressed position. The extent of such movement of the slider 5 is determined by the length of a slot 4a in the housing or body 4 of the cine camera. The major part of the slider 5 is concealed in the interior of the body 4, and this slider has a preferably serrated or knurled arm or extension 5A which extends outwardly through the slot 4a.

When the spring 6 is free to retract the slider 5 to the rest position of Figure 1, the jaws 7 and 13 reassume their solid-line positions; however, the collars 2 and 3 remain in those positions which correspond to predetermined positions of their projections 2a and 3a. Friction between the barrel 1a of the lens 1 and the collars 2, 3 is sufficient to normally prevent accidental, rather than intentional, angular displacements of these collars.

Figure 2 shows a radially outwardly-extending handle 2B which can be used by the operator to change the angular position of the collar 2. A similar handle or zoom bar (not shown) is provided on the collar 3 so that the operator can change the focal length of the lens 1 when the slider 5 is in the rest position of Figure 1.

The jaws 7, 13 and the projections 2a, 3a

can be installed in the interior of the barrel 1a and the projections 2a, 3a are parallel or substantially parallel to the optical axis 1f of the lens 1.

Figures 3, 4 and 5 illustrate portions of slightly modified cameras wherein the drive jaws 7 and 13 are replaced with substantially disk-shaped rotary drive members. All such parts of the cameras of Figures 3 to 5 which are identical with or clearly analogous to corresponding parts of the camera shown in Figures 1 and 2 are denoted by similar reference characters.

Referring first to Figure 3, the barrel for the optical elements 1b has been omitted for the sake of clarity. The driven projections or pins 2a, 3a of the collars 2, 3 extend in parallelism with the optical axis 1f of the zoom lens and the collar 3 has an arcuate slot 3b for the projection 2a. The predetermined positions of the projections 2a, 3a are respectively shown in 2a'', 3a''. The actuating member or slider 5 is reciprocable in and counter to the direction indicated by arrow 9, i.e., substantially at right angles to the optical axis 1f (the same as in the embodiment of Figures 1 and 2). A helical return spring 6 biases the slider 5 to the rest position of Figure 3. The slider 5 has a toothed rack 5a which meshes with a gear 20 on a shaft 21 which is journaled in the housing or body (not shown) of the cine camera. The shaft 21 is rigid with a smaller second gear 22 which meshes with the ring gear 23a of a disk-shaped rotary drive member 23. The latter (hereinafter called disk for short) is rotatable in the barrel of the zoom lens about the optical axis 1f and has an entraining projection or stud 23b which is a functional equivalent of the lug 7b shown in Figure 1. The gear 22 is further in mesh with gear 24 on a shaft 24a which is journaled in the camera body and carries an additional gear 25 in mesh with a gear segment 26a of a second disk-shaped rotary drive member 26 (hereinafter called disk) which is coaxial with the disk 23. The disk 26 has an arcuate cutout 26d for the stud 23b of the disk 23 and the disk 26 carries a second entraining projection or stud 26b which is a functional equivalent of the lug 13a shown in Figure 1.

When the slider 5 is moved against the opposition of the spring 6 (see the arrow 9), the disks 23, 26 rotate in opposite directions and cause their studs 23b, 26b to entrain the projections 2a, 3a to the predetermined positions 2a'', 3a'' regardless of the angular positions of collars 2 and 3 prior to movement of the slider 5 from the rest position of Figure 3. The diameters of the studs 23b, 26b are large enough to ensure that each of these studs can entrain the projection 2a and/or 3a. When the spring 6 is free to contract, the slider 5 reassumes its rest

position but the collars 2 and 3 remain in the angular positions corresponding to predetermined positions $2a''$, $3a''$ of their projections $2a$ and $3a$. The handles (corresponding to the handle 2B of Figure 2) which are used to change the angular positions of collars 2 and 3 in the rest position of the slider 5 are not shown in Figure 3. If desired, the cine camera which embodies the structure of Figure 3 can be equipped with a motor which serves to change the angular position of the zooming collar 3 in the rest position of the slider 5.

In the modification shown in Figure 4, the slider 5 has a drive arm 5c which can directly engage and entrain the driven projections $2a$, $3a$ of the collars 2, 3 from the end positions $2a'$, $3a'$ to the predetermined positions $2a''$, $3a''$. The slider 5 has a toothed rack 5a in mesh with a gear 30 which is rotatable about the axis of a fixed shaft 30a and is in mesh with the toothed rack 31a of a second slider 31 which is movable in parallelism with the slider 5. When the slider 5 moves in the direction indicated by arrow 9 against the spring 6, the slider 31 moves in the direction of arrow 9a and its arm 31b can entrain the projection $2a$ and/or $3a$ from the end position shown at $2a'$, $3a'$ to the neutral position $2a''$, $3a''$. It will be noted that the sliders 5 and 31 move in opposite directions and that their arms 5c, 31b are normally adjacent to the projections $2a$, $3a$ when these projections respectively assume the end positions shown at $2a$, $3a$ and at $2a'$, $3a'$. The spring 6 is strong enough to retract the slider 5 to the rest position of Figure 4 and to simultaneously move the slider 31 to the illustrated position. If desired, however, the structure of Figure 4 may comprise an additional spring for the slider 31 or a single spring attached to the slider 31.

Figure 5 shows a modification of the camera of Figure 4. The second slider 31 of Figure 4 is replaced with a rotary disk 33 having a ring gear 33a in mesh with the gear 30. The latter is rotated by the slider 5 in the same way as described in connection with Figure 4. The arm 33b of the disk 33 is the functional equivalent of the entraining arm 31b. When the slider 5 is caused to leave the rest position of Figure 5, the arm 5c, 33b move toward each other whereby the arm 5c and/or the arm 33b entrains the driven projection $2a$ and/or $3a$ and moves it to the predetermined position ($2a''$, $3a''$).

The directions of movement of the sliders 5 shown in Figures 4 and 5 are normal to the optical axis of the optical elements 1b, the same as in Figure 3.

A feature which is shared by all of the embodiments shown in Figures 1-2, 3, 4 and 5 is that the drive members 7, 13 or 23, 26 or 5c, 31b or 5c, 33b move in opposite

directions in response to movement of the actuating member 5 from its rest position. Thus, such drive members sweep the entire area where the driven projections $2a$, $3a$ can dwell at the time the user decides to move the collars 2, 3 to their predetermined positions. The drive members thereupon resume their starting or retracted positions to provide room for eventual movement of the collar 2 and/or 3 from the predetermined position so that a person who wishes to change the focal length of the optical elements 1b (by means of the collar 3) or to focus the image of a subject can immediately proceed with turning of the collar 2 and/or 3 without renewed shifting of the actuating member 5.

Figures 6 and 7 show a modified camera which comprises means for selecting any one of a plurality of predetermined positions for the collars 2 and 3 on the lens barrel for the optical elements 1b. In this embodiment, movement of a slider 5 from its rest position to its other (fully depressed) extreme position serves to move drive elements 2c, 3c (corresponding to the drive projections of earlier embodiments) via a driving member 41 to end positions. When the slider 5 is released, the driving member 41 initially only moves such a return distance (c-Figure 7) that the drive elements 2c, 3c are in predetermined positions, while the slider 5 returns to its rest position. Different predetermined positions are possible depending on whether a rack 41a of the driving member 41 engages a gear 54 or a gear 46.

In more detail, the collars 2 and 3 respectively comprise drive ring gears 2c, 3c which respectively mesh with first and second gears 42, 43. The gears 42, 43 are respectively rigid with coaxial shafts 44, 45, and the shaft 44 is telescoped into the shaft 45. A friction clutch (not shown) is interposed between the shafts 44 and 45 so that the gears 42, 43 normally rotate in unison but the gear 42 or 43 is rotatable relative to the gear 43 or 42 when the respective collar reaches an end position in which the associated drive ring gear is held against further rotation. The shaft 45 for the gear 43 surrounds a coaxial third shaft 46a which is rigid with a third gear 46. A second friction clutch (not shown) is interposed between the shafts 45 and 46a. The gear 46 is assumed to rotate clockwise, as viewed in Figure 6, when engaged by a toothed rack 41a of the reciprocable and pivotable driving member 41. The latter is reciprocable in parallelism with the actuating member or slider 5 and is pivotable about the axis of a shaft 47 which is parallel to the rack 41a and whose axis is normal to the common axis of the shafts 44, 45, 46a and to the optical axis 1f of the zoom lens. When the driving member 41 is pivoted anticlockwise, as viewed in Figure 6 or 7, its rack 41a

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is disengaged from the third gear 46. A helical spring 48 biases the driving member 41 upwardly, as viewed in Figure 6 or 7.

The slider 5 has an arm 5d which overlies the upper end face of the driving member 41, and the slider 5 further comprises a suitably inclined cam 5e which can be engaged by the follower arm 49c of a coupling lever 49 pivotally mounted on a shaft 50 which is parallel to the shaft 47. The lever 49 further comprises an arm 49a and a pin 49b, both movable into engagement with the driving member 41. The portions 49a and 49b of the coupling lever 49 can engage the driving member 41 in such a way that the latter maintains the teeth of its rack 41a in mesh with the teeth of the gear 46. The means for biasing the coupling lever 49 in such direction comprises a torsion spring 51 which is coiled around the shaft 50, one leg of which engages a fixed retainer 51a and the other leg of which bears against an edge face of the lever 49. The torsion spring 51 can be replaced with other biasing means which pushes or pulls the coupling lever 49 in a direction to maintain the portions 49a, 49b, in engagement with the driving member 41.

When the slider 5 is moved in the direction indicated by arrow 9, the arm 5d moves the driving member 41 in the same direction whereby the rack 41a rotates the gear 46 and the gear 46 rotates the gears 42, 43 and collars 2, 3. The extent of movement of the driving member 41 with the slider 5 is selected in such a way that the drive gears 2c, 3c can rotate the collars 2, 3 from first end positions (e.g., corresponding to the end positions 2a', 3a' of the projections 2a, 3a shown in Figure 1) to second end positions (corresponding to the other end positions of the projections 2a, 3a). In other words, when the slider 5 reaches its depressed position, each of the collars 2, 3 invariably reaches an end position (rather than a predetermined position as in the embodiments of Figures 1, 2, 3, 4 and 5). Thus, such movement of the slider 5 invariably ensures that the collars 2, 3 rotate in unison toward one of their end positions. The clutch between the shafts 44, 45 allows the gear 42 to rotate relative to the gear 43 (or vice versa) if the collar 2 reaches the selected end position ahead of the collar 3 (and vice versa). The clutch between the shafts 45 and 46a allows the shaft 46a to rotate relative to the shafts 44, 45 if both collars reach the selected end positions before the slider 5 reaches its operative position.

When the upper end face of the driving member 41 moves below the plane of the coupling lever 49, the torsion spring 51 can pivot the lever 49 counter-clockwise, as viewed in Figure 7, so that the arm 49a moves above the driving member 41 and thus

extends into the path of return movement of the member 41 under the action of the spring 48. When the slider 5 reaches its extreme (depressed) position, the upper end face of the driving member 41 is spaced apart from and is located below the arm 49a (see the distance c in Figure 7). The rack 41a remains in mesh with the gear 46 because the driving member 41 is still engaged by the pin 49b of the coupling lever 49.

The user of the camera thereupon releases the slider 5 so that the spring 6 is free to contract and to move the slider upwardly, as viewed in Figure 6 or 7. The driving member 41 can share the initial stage of such movement of the slider 5 because it is biased by the spring 48; however, the member 41 is arrested by the arm 49a as soon as it covers the distance c. During movement counter to the direction indicated by the arrow 9, the rack 41a rotates the gear 46 in a counterclockwise direction whereby the gears 46, 43, 42, 3c and 2c rotate in unison and move the collars 2, 3 to their predetermined positions (corresponding to the positions 2a'', 3a'' of the projections 2a, 3a shown in Figure 1).

The slider 5 continues to move upwardly under the action of the spring 6, and the cam 5e is responsible for briefly disengaging the coupling lever 49 from the driving member 41, which allows the driving member to disengage the gear 46 under the action of a spring 53 and return to its starting position without further rotation of the gear 46. Thus, during the upward movement of the slider 5, the cam 5e engages the follower arm 49c and pivots the lever 49 clockwise. This disengages the portions 49a, 49b of the lever 49 from the driving member 41 so that the latter is free to pivot on the shaft 47 (anticlockwise, as viewed in Figure 6 or 7), under the action of the torsion spring 53 which disengages the rack 41a from the gear 46. The spring 48 is free to return the driving member 41 to the upper position whereby the angular position of the gear 46 remains unchanged because this gear is not in mesh with the rack 41a. When the slider 5 reaches its rest position, the cam 5a is located at a level above the follower arm 49c and the coupling lever 49 is free to assume the position shown in Figure 6 in which the camera can be used for the making of exposures with a lens of average focal length and with the focusing collar 2 in a predetermined position in which the image of a subject located at an average distance from the optical elements 1b (e.g., at a distance of 5 meters) is sharply focussed on the film (e.g., 8-millimeter film) in the body of the cine camera.

Handles (not shown) enable a skilled photographer to change the angular positions of the collars 2, 3 when the slider 5 is in the

rest position in Figure 6.

The purpose of the gear 54 on the shaft 46a is to allow for selection of different predetermined positions for the collars 2, 3.

Thus, all that is necessary to change from one pair of predetermined positions to another pair of predetermined positions is to move the rack 41a of the driving member 41 from mesh with the gear 46 into mesh with the gear 54 or vice versa. This can be achieved by moving the driving member 41 relative to the gears 46, 54 or by moving the shaft 46a for the gears 46, 54 relative to the driving member. The number of teeth on the gear 54 is greater or less than the number of teeth on the gear 46 so that the angular displacement of collars 2, 3, when the driving member moves upwardly to cover the distance *c*, is different when the rack 41a meshes with the gear 46 than when the rack 41a meshes with the gear 54. For example, the gear 46 may be used to move the collars 2, 3 to first predetermined positions which are best suited for the making of exposures in daylight and at a first distance (e.g., 5 or 6 meters) from the subject, and the gear 54 may be used to move the collars 2, 3 to second predetermined positions (in which the lens can be located at a distance of 4 meters from the subject) when the camera is to be used for the making of exposures in artificial light. The focal length of the lens is preferably less when the camera is to make exposures with flash.

Figure 8 shows a portion of a cine camera wherein the angular positions of collars 2 and 3 can be changed by cords, cables or analogous flexible drive members 61, 62. The collars 2 and 3 are respectively provided with driven posts or studs 2E, 3E and the forward ends of the flexible drive members 61, 62 (hereinafter called cables for short) are secured to the respective posts. The cable 61 passes through the nip of two guide rolls 63, 64 which are mounted in the barrel 1a, and the cable 62 passes through the nip of two guide rolls 65, 66 which are mounted in the barrel 1a or in the body of the cine camera. The collar 2 assumes its predetermined position when the portion of the cable 61 between the driven post 2E and the nip of the guide rolls 63, 64 is parallel to the optical axis 1f, and the collar 3 assumes the predetermined position when the portion of the cable 62 between the driven post 3E and the nip of the guide rolls 65, 66 is parallel to the axis 1f. The rear ends of the cables 61, 62 are respectively secured to the peripheries of two rotary members or pulleys 67, 68 which are coaxial with a rotary driving disk 69. Suitable one-way friction clutches (not shown) are interposed between the rotary members 67, 68 and 67, 69 so that the pulleys 67, 68 normally share the anticlockwise movements of the disk 69 but the latter is

free to rotate clockwise with respect to both pulleys. The disk 69 can be rotated clockwise or anticlockwise by a wheel-shaped actuating member 70 through the medium of a rod 70a. The wheel 70 is biased clockwise, as viewed in Figure 8, by a helical spring 71 which tends to maintain the wheel in a rest position. Each of the cables 61, 62 may comprise an elastic portion which enables the respective cable to change its length (within certain limits).

When the user of the camera wishes to change the angular position of the collar 2 and/or 3, the respective collar is rotated by hand (e.g., by resorting to a suitable handle corresponding to the member 2B of Figure 2) and the appropriate pulley or pulleys rotates relative to the other pulleys. If the user wishes to move the collars 2 and 3 to their predetermined positions, the wheel 70 is rotated counterclockwise to stress the spring 71 and entrain the disk 69 in the same direction. The disk 69 rotates the pulley 67 and/or 68 through the medium of the respective one-way clutch(es) until the collars 2, 3 reach their predetermined positions. The wheel 70 is thereupon released so that the spring 71 contracts and returns the members 69, 70 to their rest positions. The one-way clutches allow the disk 69 to rotate with respect to the pulleys 67, 68 so that the collars 2, 3 remain in their predetermined positions. Unless the actuating member or manual control (wheel) 70 has a stop, there will be no specific end position for the wheel 70. The arrangement may be such that increased friction due to the clutch between the members 67 and 68, and 67 and 69 slipping suffices to let the user know that the predetermined positions have been reached and that he should stop turning the wheel 70. In such a case, the second position of the wheel 70 will depend on how near the collars 2, 3 are to the predetermined position; also the amount the user turns at the increased friction will vary.

If the driven posts 2E, 3E are replaced with spherical driven elements (such as the spherical element 73 of Figure 9 which has a diametrically-extending slot 73a for the front end of the cable 61), and the spherical elements 73 are biased by springs (see the spring 72 which biases the element 73 toward the adjacent end face or shoulder 1e of the barrel 1a), the element 73 snaps between the guide rolls 63, 64 when the collar 2 reaches its predetermined position (see Figure 10) and the collar then remains in such predetermined position unless and until it is subjected to torque of a magnitude which is needed to expel the spherical element 73 from the space between the rolls 63, 64. The spherical element 73 is movable in a bore 2e which is machined into the collar 2 and is parallel to the optical axis 1f. This

spherical element co-operates with the rolls 63, 64 to constitute a detent which yieldably holds the collar 2 in the predetermined position. An advantage of such detent is that the movements of the collar 2 to the predetermined position are reproducible with a maximum degree of accuracy, especially if the cable 61 comprises an elastic portion. The spherical element (not shown) for the front end of the cable 62 is analogous to the element 73.

Referring to Figure 11, there is shown a portion of a cine camera wherein a manually-operable control for setting a predetermined focal length and focus operates parallel to the optical axis of the camera.

The camera has a zoom lens 101 which comprises collars 102, 103 (respectively corresponding to aforescribed collars 2, 3) which are rotatable about the optical axis 1f and can move to positions of predetermined focal length and focus in response to movement of the manually-operable control or slider 105 from the rest position of Figure 11. The slider 105 is reciprocable in and counter to the direction indicated by arrow 109, that is parallel to the optical axis 1f. This is desirable because the slider can be pushed against the opposition of a return spring 106 by the thumb of an operator so that the remaining fingers of the same hand can be used to manipulate other components of the cine camera.

The collars 102, 103 respectively comprise driven projections 102a, 103a which correspond to the projections 2a, 3a of Figure 1. The projections extend in parallelism with the optical axis 1f. Figure 11 shows the collars 102, 103 and their projections 102a, 103a in intermediate positions (but not in those intermediate positions which constitute the predetermined positions). In the predetermined position of the collar 2, the lens is properly focused upon a subject which is located at an average distance (e.g., 5 meters) from the camera, and the focal length of optical elements in the barrel 101a of the zoom lens 101 is an average focal length. This ensures that if the exposures are made in satisfactory daylight, the depth of field is acceptable over the entire range of distances including infinity. Also, other predetermined positions can be selected in such a way that the camera can make satisfactory exposures in artificial light.

The slider 105 has an elongated slot 105b for a pin 107a on a rearwardly extending arm 107b of a plate-like support 107 which is mounted on the barrel 101a. The slider 105 further includes an elongated toothed rack 105a in mesh with a gear 120 which also meshes with a toothed rack 121c forming part of a slider 121 which is movable at right angles to the direction indicated by arrow 109. The gear 120 is mounted on an

arm of the support 107. The slider 121 has elongated slots 121a for guide pins 107c of the support 107 and includes a second toothed rack 121b which is in mesh with a gear 122 rotatably mounted on the support 107. The gear 122 is coaxial and rigid with a gear 125 and meshes with a ring gear 123a forming part of a disk-shaped rotary drive member 123. The gear 125 meshes with the ring gear 126a of a second disk-shaped rotary drive member 126 which is coaxial with the disk 123. The disks 123, 126 respectively include entraining lugs 123b, 126b which correspond to the lugs 7b, 13a of the jaws 7, 13 shown in Figure 1. Thus, the lugs 123b, 126b can move through sufficient angular distances to ensure that they entrain the driven projections 102a, 103a and move the collars 102, 103 to predetermined positions not later than when the slider 105 reaches its fully depressed position. The gear 125 is smaller than the gear 122 so that the disks 123, 126 rotate relative to each other when the slider 105 is depressed, that is, moved forwardly (arrow 109). If desired, the camera of Figure 11 may comprise means for rotating the gear 125 clockwise in response to anticlockwise rotation of the gear 122 or vice versa; this renders the structure of Figure 11 even more similar to the structure of Figure 1.

When the pressure upon the slider 105 is relaxed so that the spring 106 is free to move the slider 121 downwardly (as viewed in Figure 11) and to thereby move the slider 105 counter to the direction indicated by arrow 109, the lugs 123b, 126b move away from the projections 102a, 103a and the collars 102, 103 remain in their predetermined positions unless and until the user decides to move the collar 102 and/or 103 to the one or other end position or to an intermediate position other than the predetermined position.

It will be noted that the support 107 carries the slides 105, 121 and the gears 120, 122, 125. In addition, the support 107 preferably carries the optical elements 128, 129, 130, 131 and 132 of the view finder, light meter or range finder of the cine camera. This is desirable since, and in view of the fact that the support 107 is mounted on the barrel 101a, all components of the zoom lens plus the means for moving the collars 102, 103 to predetermined positions and the view finder can be assembled and properly adjusted before the barrel 101a is attached to the camera body. As mentioned above, the movability of slider 105 in parallelism with the optical axis 1f is desirable because the slider 105 can be moved by the thumb, i.e., by that finger which is less likely to be necessary for manipulation of other components or elements of the camera. Consequently, other fingers of the same hand can

be used while the thumb pushes the slider 105 against the opposition of the spring 106. This spring tends to pull the slider 121 downwardly, as viewed in Figure 11 and tends to return the slider 105 via the gear 120.

Figure 12 shows the zoom lens of a cine camera wherein collars 202, 203, which correspond to the collars 2, 3 of Figures 1 and 2, are spring biased into predetermined, end, positions. The collars 202, 203 are normally subject to a braking and clamping member 204 which allows the collars to be set to the desired position and holds them in those positions against the spring action. A manual control 207 is operable to release the braking member and thereby cause the collars to assume the predetermined positions.

The zoom lens 201 has a barrel 201a and optical elements 201b. The barrel 201a further carries the braking and clamping member 204 (hereinafter called shoe or brake shoe for short) which can be moved into frictional engagement with the collars 202 and 203. The shoe 204 is pivotable about the axis of a shaft 205 and is biased by a torsion spring 206 in a direction to engage the collars 202 and 203. This shoe is in the form of a two-armed lever one arm of which can engage the collars and the other arm of which extends rearwardly and is formed with a slightly bent rear end portion 204a receivable in a recess or socket 207a of the tubular sleeve-like manual control 207. The control 207 is movable forwardly (arrow 208) toward an extreme position against the opposition of a helical spring 209. The collars 202, 203 are coaxial with the control 207 (hereinafter called sleeve).

The collars 202 and 203 are respectively provided with driven projections 202a, 203a. These collars are movable under the action of springs 210, 211 in opposite senses to end positions, which are also predetermined positions of medium focus and medium focal length. To rotate the collars manually, one must be rotated clockwise from an end position to thereby effect appropriate changes in focal length or to bring the image of a subject into focus, and the other collar must be rotated counterclockwise from the end position. The helical springs 210, 211 are further connected to a retainer 212 on the barrel 201a. The force with which the shoe 204 can engage the collars 202, 203 in order to hold the collars against rotation exceeds the maximum bias of the springs 210 and 211.

In Figure 12, the shoe 204 engages the collars 202 and 203. Therefore, when the user of the camera changes the angular position of the collar 202 or 203 against the opposition of the respective spring 210 or 211, the collar 202 or 203 remains in the newly selected angular position because the

braking force of the shoe 204 cannot be overcome by the spring 210, 211, even if both springs are stressed to a maximum extent.

If the user thereupon decides to move the collars 202 and 203 to the predetermined positions, the sleeve 207 is moved in the direction indicated by arrow 208. An inclined cam surface in the groove 207a engages the end portion 204a and pivots the shoe 204 against the opposition of the spring 206 whereby the shoe releases the collars 202, 203 and the springs 210, 211 are free to dissipate energy. When the collars 202 and 203 reach the aforementioned end positions, the focal length of the zoom lens 201 is set for an average value and the image of a subject is in sharp focus if the camera is held at a distance of 5 or 6 meters from the subject. When the sleeve 207 is released so that it can be moved by spring 209 back to the rest position of Figure 12, the spring 206 returns the shoe 204 into frictional engagement with collars 202 and 203 which then remain in the respective predetermined positions unless and until the operator decides to move the collar 202 and/or 203 to a different angular position.

The zoom lens of Figure 13 differs from the zoom lens 201 of Figure 12 in that each of the collars 202, 203 is biased by two springs acting in opposite directions. Thus, the collar 202 is biased by two helical springs 210a, 210b which are attached to the driven projection 202a. The springs 210a, 210b are further respectively attached to retainers or posts 212b, 212a. Analogously, the springs 211a, 211b for the collar 203 are attached to the projection 203a, and the outer ends of these springs are respectively attached to the posts 212b, 212a. The posts 212a, 212b are mounted on the barrel 201a. The sleeve 207 has a forked extension or detent 214 with a slot 214a the outer end of which is flanked by two inclined guide faces 214b.

The rest position of the sleeve 207 is shown by phantom lines and the fully depressed position is shown by solid lines. When the sleeve 207 is moved toward the operative position, the shoe 204 is disengaged from the collars 202, 203 and the springs 210a, 210b and 211a, 211b are free to move the respective collars to their predetermined positions. The forked extension 214 shares the forward movement of the sleeve 207 and its inclined faces 214b guide the projections 202a, 203a into the slot 214a to thus ensure that the predetermined positions of the collars 202, 203 are the same in response to each forward movement of the sleeve. In other words, the extension 214 ensures that the collars 202, 203 invariably assume their predetermined positions as soon as the projections 202a, 203a enter the slot 214a, even if the springs 210a to 211b exhibit a tendency to move the collars back and forth to both

sides of the predetermined positions.

When the spring 209 is free to contract, the sleeve 207 returns to the rest position and the shoe 204 engages the collars 202, 203 to hold them in predetermined positions. Since the braking action of the shoe 204 is stronger than the bias of the springs 210a to 211b, the operator can move the collar 202 and/or 203 which then remains in the newly selected position.

The sleeve 207 of Figures 12 and 13 may be provided with a recess 207b of suitable configuration for insertion of a thumb which is used to move the sleeve to its fully depressed position.

An advantage of the zoom lenses of Figures 12 and 13 is that the driving means (springs 210, 211 or 210a to 211b) need not be connected to the manual control 207. This contributes to the simplicity of the construction. All the manual control 207 has to do is to disengage the shoe 204 from the collars 202, 203 whereby the springs automatically move both collars to predetermined positions.

Another advantage of the zoom lenses of Figures 12 and 13 is that the shoe 204 normally bears against the two collars so that the collars remain in selected angular positions with a higher degree of reliability than if such selected positions were maintained solely as a result of frictional engagement between the collars and the barrel. The force which is necessary to change the angular positions of the collars is increased because such force must overcome the friction between the shoe 204 and the collars as well as the resistance of the springs 210, 211 or 210a to 211b.

Referring to Figures 14 and 15, there is shown a portion of a further cine camera which comprises a battery-operated motor (not shown) for film transport and/or for the zoom lens (not shown). In this embodiment, a manual control for setting the lens to predetermined focus and predetermined focal length, is also operable to switch on a master switch of the camera.

Figure 14 merely shows the manual control 301 which corresponds to the manual control 105 of Figure 11 and is biased to a rest position by a helical spring 302. The manner in which the movement of manual control 301 to its fully depressed position results in movement of collars on the barrel of the zoom lens to predetermined positions is the same as described in connection with Figure 11.

When the manual control 301 is in the rest position of Figure 14, the collars on the barrel can be rotated with or relative to each other between two spaced-apart end positions and to any one of a practically unlimited number of intermediate positions (including one or more predetermined positions). The manual control has an entraining shoulder

303 and is reciprocable (in and counter to the direction indicated by arrow 304) in parallelism with the optical axis of the zoom lens. If desired, however, the manual control 301 can be mounted for movement at an angle to the optical axis, for example, tangentially of the barrel in a manner similar to that shown in Figures 1 to 10.

The cine camera has a so-called master switch 305 (Figure 15) which must be closed prior to actuation of the release trigger 309 in order to enable the motor to transport the film and/or to change the focal length of the zoom lens. The master switch 305 should normally remain open to avoid premature exhaustion of the battery, batteries or other source or sources of electrical energy for the motor or motors of the cine camera. As shown in Figure 15, the master switch 305 comprises a slidable finger piece or knob 305a whose front face is serrated and which extends from and or is accessible in the camera body. The knob 305a is movable in and counter to the direction indicated by arrow 304. When the knob 305a is moved to the "O" position, the master switch 305 is open to prevent gradual exhaustion of one or more batteries not shown. In such "O" position of the knob 305a, a springy contact 306 of the master switch 305 does not engage any of the four terminals 307a, 307b, 308a, 308b of the master switch. These terminals are connected in the electric circuit of the camera. The terminals 307a, 307b and 308a, 308b are respectively in parallel with each other and in series with the motor switch (not shown). The motor switch is closed in response to actuation of the camera release 309, i.e., in response to movement of such release counter to the direction indicated by arrow 304.

The knob 305a of the master switch 305 is movable from the "O" position to a position "E" (by moving in the direction indicated by arrow 304) in which the circuit is completed because the two arms of the springy contact 306 engage the terminals 307a, 308a. Still further, the knob 305a is movable (in the direction indicated by arrow 304) to a position "BK" in which a pointer (not shown) or the like assumes a position which is indicative of the charge of the batteries. To this end, the knob 305a is connected with an elongated trip 310 having a bent-over front portion or lug 310a which closes a battery check switch 311 when the knob assumes the position "BK".

The knob 305a of the master switch 305 is further movable to a position "D" (the knob reaches such position by moving from the position "BK", "E" or "O" counter to the direction indicated by arrow 304) in which the arms of the springy contact 306 engage the terminals 307b and 308b to complete the corresponding part of the electrical circuit

of the camera. When the knob 305a assumes the position "D", a pawl 312 (which is biased by a leaf spring 311a or the like) can enter a notch 310c of the trip 310 whereby a catch in the form of a projection 312a of the pawl 312 engages a complementary projection 309a of the release 309 and maintains the latter in depressed position so that the camera can make a series of exposures, even if the finger pressure upon the release 309 is relaxed or terminated.

A detent 313 (e.g., a sphere) is preferably provided to yieldably hold the knob 305a in the position "O". To this end, the detent 313 is biased by a spring 313a and penetrates into a notch of suitable configuration 310b of the trip 310 when the knob 305a reaches the "O" position.

The knob 305a of the master switch 305 is received in an elongated slot 314a of a driven slider 314 which is reciprocable in and counter to the direction indicated by arrow 304. The slider 314 has an extension 314b which is located in the path of movement of the shoulder 303 on the manual control 301. The length of the slot 314a is such that the knob 305a can be moved by hand relative to the slider 314 to any of the positions "O", "D", "E" and "BK". When the control 301 is fully depressed, the extent to which the control 301 can move the slider 314 is always sufficient to move the knob 305a to the position "BK". Thus, the slider 314 automatically moves the knob 305a from the position "D", "O" or "E" and all the way to the position "BK" whenever the user of the camera decides to move the collars for focussing and focal length adjustment to their predetermined positions. This enables the user to check the condition of batteries whenever the control 301 reaches its fully depressed position. When the control 301 reaches the fully depressed position, the trip 310 not only closes the battery check switch 311 but also stresses the elastic contacts of the switch 311, i.e., such contacts store energy and move the knob 305a to the position "E" as soon as the spring 302 is free to dissipate energy in order to return the control 301 to the rest position of Figure 14. Consequently, the master switch 305 is closed in automatic response to movement of the control from rest position to fully depressed position and back to rest position so that the user can start with the making of exposures by the simple expedient of depressing the release 309. Such exposures are made while the collars assume their predetermined positions unless, of course, the user has decided to change the position of the one and/or the other collar prior to depression of the release.

An important advantage of the camera which embodies the structure of Figures 14 and 15 is that the camera is invariably

ready for the making of exposures when the collars on the barrel of the zoom lens are caused to assume their predetermined positions in response to depression of manual control 301. This ensures that an unskilled photographer who is not familiar with the purpose and/or art of focussing and/or zooming can make exposures of acceptable quality under different circumstances by the simple expedient of shifting the control 301 against the opposition of the spring 302 and by thereupon permitting the spring 302 to return the control to the rest position. The slider 314 constitutes but one form of driven means which can be used to move the knob 305a to the position "BK" in response to movement of the control 301 against the opposition of the spring 302. Such slider can be replaced by one or more levers, a gear train, a system of cables or any other motion transmitting means which can ensure that the master switch 305 is closed not later than when the control reassumes its rest position.

If the camera does not have a battery check switch, the elastic contacts of the switch 311 shown in Figure 15 are replaced by a spring (not shown) which is stressed when the control 301 reaches its fully depressed position and which thereupon dissipates energy to move the knob 305a to the position "E". Alternatively, and especially in the absence of a battery checking device, the movement of control 301 can result in movement of the knob 305a to the position "E" as soon as the control 301 is fully depressed.

The switch 305 may constitute (or be replaced by) a selector switch, e.g., a switch which selects the motor speed.

Various features from each embodiment of Figures 1 to 5 could be adapted so that the jaws 7, 13, 5c, 31b or 5c, 33b of the rotary members 23b, 26b are made to close in response to movement of a manual control parallel to the optical axis (as in Figure 11) rather than perpendicular. Alternatively, the jaws or rotary members could be spring-biased to the predetermined position and provided with a braking member and means to release the braking member, as in Figure 12. Similarly, the jaw arrangement 123b, 126b of Figure 11 could be closed by movement of a manual control perpendicular to the optical axis, as in Figures 1 to 5, and the braking members of Figures 12 and 13 could be released by a manual control movable perpendicular to the optical axis. Further, the arrangement of Figure 14, whereby the master switch is closed on movement of the manual control from the first to the second position, is applicable to all the embodiments.

In each of the embodiments, the manual control is operative to rapidly set the lens to

a predetermined focal length and to a predetermined focussing position. It may, however, be possible so to design the camera that the lens is a field focus lens, in other words, so that the focussing means are dispensed altogether.

The cameras are preferably for narrow gauge film, for example, 8mm or Super 8 size.

WHAT WE CLAIM IS:—

1. A cine camera having a lens of variable focal length and a manually operable control movable between first and second positions, wherein, in response to movement of the control from the first position to the second and back to the first, the lens is set to a predetermined focal length at least by the completion of that movement, irrespective of the focal length setting prior to that movement of the control.

2. A cine camera as claimed in claim 1, wherein the lens has focussing means, and, in response to movement of the control from the first position to the second position and back to the first, the focussing means is set to a predetermined setting at least by the completion of that movement, irrespective of the focussing setting prior to that movement of the control.

3. A cine camera as claimed in claims 1 or 2, wherein the control is resiliently biased to the first position.

4. A cine camera as claimed in any one of claims 1 to 3, wherein the focal length of the lens is variable by rotary movement of a driven member about the optical axis of the lens.

5. A cine camera as claimed in any one of claims 2 to 4, wherein a first driven member is movable to vary the focussing of the lens, and a second driven member is movable to vary the focal length of the lens, and there is provided a pair of jaws so coupled to the control that, when the control is in the first position, the jaws are open and the driven members are located between the jaws whatever the focal length and focussing set and, when the control is moved from the first position to the second position, the jaws close and thereby drive the driven members to positions corresponding to the said predetermined focal length and focussing.

6. A cine camera as claimed in claim 5, wherein there is provided means for biasing the control to the first position.

7. A cine camera as claimed in claims 5 or 6, wherein the jaws are pivotable levers.

8. A cine camera as claimed in claim 7, wherein one of the jaws is directly coupled to the control, and the other is pivotable by means of a gear secured to the said one jaw and a meshing gear secured to the other jaw.

9. A cine camera as claimed in claims 5 or 6, wherein the jaws are reciprocable toward and away from each other.

10. A cine camera as claimed in claim 9, wherein the jaws are formed on sliders, each of which has a toothed rack in mesh with the same gear, and one of the sliders being rigidly secured to the manually operable control.

11. A cine camera as claimed in claim 5, wherein one of the jaws is formed by or on a reciprocable member and the other is formed by or on a rotary member.

12. A cine camera as claimed in claim 11, wherein the reciprocable member is rigidly connected to the manual control.

13. A cine camera as claimed in any one of claims 2 to 4, wherein a first driven member and a second driven member are movable in a rotary direction about a common axis to vary the focussing of the lens and to vary the focal length of the lens, respectively, and there is provided a pair of rotary members movable about the common axis, the rotary members being so coupled to the control that, when the control is in the first position, the rotary members are spaced apart and the driven members lie between them whatever the focal length and focussing set and, when the control is moved from the first position to the second position, the rotary members move together and thereby drive the driven members to positions corresponding to the said predetermined focal length and focussing.

14. A cine camera as claimed in claim 13, wherein the rotary members are movable by means of a toothed rack on the manual control and gear teeth associated with the rotary members.

15. A cine camera as claimed in any one of claims 2 to 4, wherein the lens is set to settings of focal length and focussing that lie at ends of the respective ranges over which the focal length and focussing are variable, in response to movement of the control from the first to the second position, and is set to the predetermined focal length and focussing during the return movement of the control from the second position to the first position.

16. A cine camera as claimed in claim 15, wherein there is provided a mobile driving member capable of being moved by the manual control, a first gear for moving a first driven member to vary the focussing of the lens, a second gear for moving a second driven member to vary the focal length of the lens, a further gear rotatable by the driving member, and clutch means interposed between the further gear and the first and second gears to allow relative movement between the further gear and each of the first and second gears if the lens is at the end settings of focal length or focussing before the manual control has reached the second position.

17. A cine camera as claimed in claim 15 or claim 16, wherein there is provided

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a predetermined focal length and to a predetermined focussing position. It may, however, be possible so to design the camera that the lens is a field focus lens, in other words, so that the focussing means are dispensed altogether.

The cameras are preferably for narrow gauge film, for example, 8mm or Super 8 size.

10 WHAT WE CLAIM IS:—

1. A cine camera having a lens of variable focal length and a manually operable control movable between first and second positions, wherein, in response to movement of the control from the first position to the second and back to the first, the lens is set to a predetermined focal length at least by the completion of that movement, irrespective of the focal length setting prior to that movement of the control.

2. A cine camera as claimed in claim 1, wherein the lens has focussing means, and, in response to movement of the control from the first position to the second position and back to the first, the focussing means is set to a predetermined setting at least by the completion of that movement, irrespective of the focussing setting prior to that movement of the control.

3. A cine camera as claimed in claims 1 or 2, wherein the control is resiliently biased to the first position.

4. A cine camera as claimed in any one of claims 1 to 3, wherein the focal length of the lens is variable by rotary movement of a driven member about the optical axis of the lens.

5. A cine camera as claimed in any one of claims 2 to 4, wherein a first driven member is movable to vary the focussing of the lens, and a second driven member is movable to vary the focal length of the lens, and there is provided a pair of jaws so coupled to the control that, when the control is in the first position, the jaws are open and the driven members are located between the jaws whatever the focal length and focussing set and, when the control is moved from the first position to the second position, the jaws close and thereby drive the driven members to positions corresponding to the said predetermined focal length and focussing.

6. A cine camera as claimed in claim 5, wherein there is provided means for biasing the control to the first position.

7. A cine camera as claimed in claims 5 or 6, wherein the jaws are pivotable levers.

8. A cine camera as claimed in claim 7, wherein one of the jaws is directly coupled to the control, and the other is pivotable by means of a gear secured to the said one jaw and a meshing gear secured to the other jaw.

9. A cine camera as claimed in claims 5 or 6, wherein the jaws are reciprocable toward and away from each other.

10. A cine camera as claimed in claim 9, wherein the jaws are formed on sliders, each of which has a toothed rack in mesh with the same gear, and one of the sliders being rigidly secured to the manually operable control.

11. A cine camera as claimed in claim 5, wherein one of the jaws is formed by or on a reciprocable member and the other is formed by or on a rotary member.

12. A cine camera as claimed in claim 11, wherein the reciprocable member is rigidly connected to the manual control.

13. A cine camera as claimed in any one of claims 2 to 4, wherein a first driven member and a second driven member are movable in a rotary direction about a common axis to vary the focussing of the lens and to vary the focal length of the lens, respectively, and there is provided a pair of rotary members movable about the common axis, the rotary members being so coupled to the control that, when the control is in the first position, the rotary members are spaced apart and the driven members lie between them whatever the focal length and focussing set and, when the control is moved from the first position to the second position, the rotary members move together and thereby drive the driven members to positions corresponding to the said predetermined focal length and focussing.

14. A cine camera as claimed in claim 13, wherein the rotary members are movable by means of a toothed rack on the manual control and gear teeth associated with the rotary members.

15. A cine camera as claimed in any one of claims 2 to 4, wherein the lens is set to settings of focal length and focussing that lie at ends of the respective ranges over which the focal length and focussing are variable, in response to movement of the control from the first to the second position, and is set to the predetermined focal length and focussing during the return movement of the control from the second position to the first position.

16. A cine camera as claimed in claim 15, wherein there is provided a mobile driving member capable of being moved by the manual control, a first gear for moving a first driven member to vary the focussing of the lens, a second gear for moving a second driven member to vary the focal length of the lens, a further gear rotatable by the driving member, and clutch means interposed between the further gear and the first and second gears to allow relative movement between the further gear and each of the first and second gears if the lens is at the end settings of focal length or focussing before the manual control has reached the second position.

17. A cine camera as claimed in claim 15 or claim 16, wherein there is provided

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means for biasing the driving member against movement corresponding to the movement of the control from the first position to the second position, and means for disengaging the driving member from the further gear after it has moved, from the second position, a distance such as to set the lens to the predetermined focal length and focussing.

18. A cine camera as claimed in claim 17, wherein the driving member includes a toothed rack in mesh with the further gear.

19. A cine camera as claimed in any one of claims 16 to 18, wherein the first and second driven members are ring gears in mesh with the respective first and second gears, respectively.

20. A cine camera as claimed in claim 17, wherein there is provided coupling means controlled by the manual control and operative to maintain the driving member in engagement with the further gear and to arrest the driving member when the lens is set to the predetermined focal length and focussing during movement of the manual control to the second position.

21. A cine camera as claimed in claim 20, wherein the manual control is operative, on return from the second position to the first position, to free the driving member from the action of the coupling means to allow the driving member to return to the starting position.

22. A cine camera as claimed in claim 21, wherein the coupling means is normally biased against the driving means to maintain it in engagement with the further gear against a spring urging the driving means out of engagement therewith, and the manual control is operative to move the coupling means against its bias to enable the driving means to disengage the gear.

23. A cine camera as claimed in claim 22, wherein the coupling means is a lever which is pivotable about a fixed axis and the manual control has a cam for pivoting the lever out of engagement with the driving means on the return movement of the manual control.

24. A cine camera as claimed in any one of claims 16 to 23, wherein there is provided an additional gear coaxial with the further gear, the driving member being movable into engagement with the further or the additional gear, to provide further predetermined focal length and focussing when the driving member engages the additional gear.

25. A cine camera as claimed in any one of claims 2 to 4, wherein there is provided a flexible element respectively coupled to members movable to vary the focal length and focussing of the lens, and the manual control is operative to move the flexible elements lengthwise when moving from the first to the second position.

26. A cine camera as claimed in claim

25, wherein the manual control is movable in a rotary direction and moves the flexible elements via rotary members and one-way friction clutch means interposed between the rotary members.

27. A cine camera as claimed in claim 26, wherein the manual control is biased to the first position, and the clutch means is operative to effect the movement of the flexible element in response to rotation of the manual control to the second position.

28. A cine camera as claimed in claim 27, wherein the flexible elements have ends secured to driven members that are movable to vary the focal length and focussing, respectively, and are trained around guide means intermediate the ends of the elements and the rotary members.

29. A cine camera as claimed in any one of claims 25 to 28, wherein there is provided detent means for yieldably holding the movable members in the positions corresponding to predetermined focal length and focussing.

30. A cine camera as claimed in any one of claims 1 to 29, wherein the manual control is movable between the first and second positions in a direction at an angle to the optical axis of the lens.

31. A cine camera as claimed in claim 30, wherein the manual control is movable between the first and second positions in a direction at right angles to the optical axis of the lens.

32. A cine camera as claimed in any one of claims 1 to 29, wherein the manual control is rotatable between the first and second positions.

33. A cine camera as claimed in any one of claims 1 to 29, wherein the manual control is movable in parallelism with the optical axis of said lens.

34. A cine camera as claimed in claim 33, wherein the manual control is adapted to be pressed forward by the thumb to move from the first to the second position.

35. A cine camera as claimed in claim 33 or claim 34, wherein the motion parallel to the optical axis is converted to motion perpendicular to the optical axis by means of a rack parallel to the optical axis on the manual control and a rack perpendicular to the optical axis, the racks lying in parallel planes and being connected by gears.

36. A cine camera as claimed in any one of claims 33 to 35, wherein a first driven member is movable to vary the focussing of the lens, and a second driven member is movable to vary the focal length of the lens, and there is provided a pair of jaws so coupled to the control that, when the control is in the first position, the jaws are open and the driven members are located between the jaws whatever the focal length and focussing set and, when the control is moved

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from the first position to the second position, the jaws close and thereby drive the driven members to positions corresponding to the said predetermined focal length and focussing.

37. A cine camera as claimed in claim 36, wherein the jaws are driven via a toothed rack movable with the manual control and a train of gears interposed between said rack and the jaws.

38. A cine camera as claimed in claim 37, wherein there is provided a support for said train of gears, the lens having a barrel connected with the support.

39. A cine camera as claimed in claim 38, wherein a system of optical elements is mounted on the support.

40. A cine camera as claimed in claim 39, wherein the optical elements form part of a view finder.

41. A cine camera as claimed in claims 2 to 4, wherein there is provided resilient means for biasing the lens to the predetermined focal length and focussing, braking means for allowing the lens to be set to, and maintained at, a desired focal length and focussing, respectively, the braking means overcoming the bias of the resilient means, and the manual control is operable to release the braking means in response to movement to the second position to cause the lens to assume the predetermined focal length and focussing under the action of the resilient means.

42. A cine camera as claimed in claim 41, wherein part of the manual control forms means for disengaging the braking means.

43. A cine camera as claimed in claim 41 or 42, wherein the resilient means comprises a respective pair of springs for a first driven member movable to vary the focussing of the lens, and a second driven member movable to vary the focal length of the lens.

44. A cine camera as claimed in claim 43, wherein each movable member is rotatable between end positions thereof and the springs of the respective pair are arranged to respectively bias the driven member in clockwise and counter-clockwise directions.

45. A cine camera as claimed in claims 41 to 44, wherein the predetermined positions are end positions of the ranges over which the focal length and focussing are variable.

46. A cine camera as claimed in claim 45, wherein a first driven member is rotatable to vary the focussing of the lens, and a second driven member is rotatable about the same axis to vary the focal length of the lens, and the members are biased by the resilient means in opposite directions.

47. A cine camera as claimed in claims 41 to 46, wherein a first driven member is movable to vary the focussing and a second driven member is movable to vary the focal

length, and the manual control has detent means for engaging the driven member in the second position of the manual control.

48. A cine camera as claimed in claim 47, wherein the manual control is movable in parallelism with the optical axis of said lens and the detent means comprises a fork provided on the manual control and defining a slot for the driven members.

49. A cine camera as claimed in claim 48, wherein the fork further comprises guide faces along which the driven members move into the slot during movement of the manual control to the second position.

50. A cine camera as claimed in claims 1 to 4, wherein there is provided a source of electrical energy, switch means in circuit with said source, and means for closing the switch means in response to movement of the manual control to the second position.

51. A cine camera as claimed in claim 50, wherein the closing means is provided on the manual control.

52. A cine camera as claimed in claim 51, wherein the closing means comprises a slider which receives motion from the manual control during movement of the manual control between said positions thereof.

53. A cine camera as claimed in claims 50 to 52, wherein the closing means comprises a member which is pivoted by the manual control during movement of the manual control between said positions thereof.

54. A cine camera as claimed in claims 50 to 53, wherein the switch means includes contact means movable between a plurality of positions including a first position in which the switch means is closed and a second position, the closing means including means for moving the contact means to the second position in response to movement of the manual control to the second position and means for automatically moving the contact means from the second to the first position in response to movement of the manual control from the second position.

55. A cine camera as claimed in claim 54, wherein the means for moving the contact means from the second to the first position includes at least one resilient element.

56. A cine camera as claimed in claim 55, wherein there is provided means for checking the condition of said energy source the condition checking means being rendered operative by the switch means in the second position of the contact means.

57. A cine camera as claimed in claims 54 to 56, wherein the manual control and the contact means are movable in parallelism with the optical axis of said lens.

58. A cine camera as claimed in claims 50 to 57, wherein the closing means comprises an entraining portion provided on the manual control and a motion transmitting

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- element interposed between the entraining portion and the switch means to close said switch means in response to movement of the manual control from the first position.
- 5 59. A cine camera as claimed in claim 58, wherein the switch means comprises a contact which is movable with respect to the element in the first position of the manual control.
- 10 60. A cine camera as claimed in claim 59, wherein the switch means further comprises a knob connected with the contact and the element has an elongated slot through which the knob extends.
- 15 61. A cine camera as claimed in claims 50 to 60, wherein the switch means comprises contact means movable between a plurality of positions including at least one closed position which said contact means assumes not later than upon completion of movement of the manual control from the first position to the second and back to the first position.
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62. A cine camera as claimed in claims 50 to 61, wherein the switch means comprises contact means movable between a plurality of positions including at least one closed position which said contact means assumes not later than upon completion of movement of the manual control from the first position to the second position and back to the first position, and further comprising detent means for yieldably holding the contact means in at least one of said positions thereof.
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63. A cine camera substantially as hereinbefore described, with reference to, and as shown in, Figures 1 and 2, 3, 4, 5, 6 and 7, 8, 9 and 10, 11, 12, 13, or 14 and 15 of the accompanying drawings.

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