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DRAWINGS ATTACHED

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(54) PHOTOGRAPHIC ROLL FILM MAGAZINE AND CAMERA THEREFOR

- (71) We, EASTMAN KODAK COMPANY, a Company organized under the Laws of the State of New Jersey, United States of America of 343 State Street, Rochester, New York 14650, United States of America 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 film magazines of the type which integrally include means for supporting an exposure frame of the film in the magazine at the focal plane of a camera adapted to receive the magazine, and particularly to magazines including roll film supply and take-up chambers as described and claimed in Letters Patent No. 1,034,904.
- In film magazines of the type described in the above-identified patent, the exposure position and flatness of a frame of film are established by a flat film support surface on the back casing member of the magazine. The front magazine casing member, which is formed separately from the back casing member and joined thereto during assembly of the magazine, includes a film exposure aperture and guide means for the exposure frame portion of the film cooperating with the film support surface to space the aperture from the back casing member. In prior magazines of this type, the front casing member also defines a seating surface adjacent the exposure aperture. This seating surface mates with corresponding camera structure to position the magazine in predetermined relation to the camera objective so that the exposure frame will lie in the focal plane of the objective.
- However, the film support surface on the rear casing member must be positioned with critical accuracy relative to the camera lens system. Therefore, the employment of support surface means on the front casing member to locate the exposure frame relative to the lens system requires that the two casing members be joined with correspondingly critical accuracy to ensure a precise, predetermined relation between the film support surface and the seating surface on the front casing. In present commercially produced magazines of this type, the two casing members are formed of moulded plastics with the precise relation of the two assembled members being established by internal abutment surfaces. Due to the high degree of dimensional accuracy with which these abutment and seating surfaces must be located to provide acceptable magazines, this form of construction dictates a correspondingly high degree of accuracy in the manufacture and maintenance of moulds used to produce the casing members and similarly critical control of the moulding and assembly operations. Such conditions can be realized by highly skilled technicians employing sophisticated production equipment. For practical purposes, however, the difficulties involved often require the redefinition of an "acceptable" magazine to provide more realistic but wider less desirable tolerance limitations, particularly if the magazines are to be produced in quantities that are insufficient to justify the expense associated with such highly sophisticated production apparatus and techniques.
- It is an object of the present invention greatly to reduce the problems inherent in the above - described magazine whilst preserving the advantages of the former, self contained magazines, by substantially reducing the criticality of the dimensional relation of the two casing members.

In accordance with the present invention, there is provided a photographic roll film magazine comprising front and back casing members respectively located substantially forwardly and rearwardly of a film support surface integrally defined by the back casing member, and a forwardly facing magazine seating surface or surfaces which engages or engage, when the magazine is in use in a camera, a corresponding rearwardly facing support surface or surfaces of the camera to maintain the area of film in contact with the film support surface in the focal plane of the camera objective for exposure, wherein the magazine seating surface or surfaces is or are defined by the back casing member of the magazine.

The invention also provides a photographic camera arranged to receive a magazine as stated in the preceding paragraph and comprising a lens, a box-like member defining an exposure gate perpendicular to the optical axis of the lens and whereat, in use, film on the film support surface of the magazine, may be exposed and wherepast film may be transported, intermittently to locate, sequentially, unexposed areas of film in the exposure gate, the box-like member comprising a rib surrounding the gate; the rib being arranged to co-operate, in use, with a channel defined by the front casing member of the magazine to form therewith a light-tight seal peripherally of the exposure gate; the rib having rearwardly projecting members laterally disposed relative to the path of film transportation, the rearwardly projecting members having rearwardly facing support surfaces arranged to engage, when the magazine is in use in the camera, the forwardly facing seating surface or surfaces of the back casing member of the magazine to maintain an area of film on the film support surface integrally defined by the back casing member of the magazine, in the focal plane of the lens of the camera.

In the accompanying drawings;

Fig. 1 is an exploded perspective view of a loaded film magazine according to the present invention;

Fig. 2 is an enlarged front elevational view of the loaded magazine shown in Fig. 1 with a portion of the film and its protective backing paper shown broken away in the exposure frame area thereof;

Fig. 3 is a perspective view of a camera according to the invention showing the film magazine in position for insertion into the camera;

Fig. 4 is a section, to an enlarged scale, taken on the line 4—4 of Fig. 3, showing also in cross-section a portion of the magazine support member of the camera in supporting engagement with the magazine;

Fig. 5 is an exploded view of a second

embodiment of loaded film magazine according to the invention; and

Figs. 6—8 are further views of the magazine of Fig. 5 that correspond respectively to Figs. 2—4 of the first embodiment.

Because photographic cameras and film magazines generally are known, the present description will be directed in particular to elements forming part of, or cooperating more directly with, the present invention, camera and magazine elements not specifically shown or described herein being understood to be selectable from those known in the art.

Referring first to Fig. 1, the film magazine according to this embodiment comprises a front casing member 11, a rear casing member 12, a film take-up spool 13, a strip of light protective paper 14 attached to the spool and a length of photographic film 15 interleaved with the protective paper. The casing members and spool preferably are made of a moulded plastics material. In the assembled magazine, the film and paper initially are wound to form a film supply roll 16, which is housed in a film supply chamber 17 formed by the cooperation of the two casing members. The paper and film strip then are transported across an exposure aperture 18 in the forward wall portion of the front casing member onto the spool 13, located in a take-up chamber 19 also defined by the two casing members. With the magazine components so disposed, the rear casing member is cemented or otherwise permanently joined to the front casing member with the film being housed entirely within the supply chamber. When the magazine is loaded into a camera, the spool 13 is engaged by a winding mechanism, whereby the film and paper are wound onto the spool to move successive exposure frame areas of the film into alignment with the exposure aperture as shown in Fig. 2. To locate the film exposure area adjacent the aperture in a flat plane in predetermined relation to the magazine structure, the rear wall portion of the back casing member is provided with an integral flat, rectangular film support surface 21, as shown in Figs. 2 and 4, against which the film and paper are supported by surface 22 of the front casing member 11 surrounding the exposure aperture and engaging the film about the margin of the exposure frame area. As shown in Fig. 4, this surface 22 is spaced from surface 21 at a distance equal approximately to the combined thickness of the film and paper, by engagement of abutment surfaces 23 on the front casing member with corresponding areas of a surface 24, located on the back cover member laterally of support surface 21. This engagement is maintained by cementing or otherwise joining the two casing members along the respective adjacent edge surfaces 25 and 26.

As shown in Fig. 3, a camera adapted to

accommodate the film magazine comprises a main housing 27 provided with a central boxlike member 28 located between chambers 29 and 31 adapted respectively to receive freely the film supply and take-up chamber portions of the magazine. A continuous rearwardly projecting rib 32 is provided along the rearward portion of member 28, and is adapted to be received by a corresponding channel 33 surrounding the exposure aperture of the magazine as shown in Fig. 2. The cooperating rib and channel form a labyrinth light barrier between the two units so that, of the camera components, only the boxlike member 28 need to be light-tight.

To position the magazine with the film exposure area in the focal plane of lens or objective 34 at the front of camera member 28, the construction in the above-identified Patent utilized the bottom surface 35 of channel 33 and the edge surface 36 of rib 32 as cooperating magazine seating surfaces, with these two surfaces being held in engagement by spring means, as shown at 37, adapted to engage corresponding pressure pads 38 on the magazine back when the back cover door 39 of the camera is closed.

As previously discussed, the present invention eliminates the necessity for maintaining this very critical dimensional relation between the front and rear casing members. Although not a necessary part of the invention as far as the magazine is concerned, the front casing member may still incorporate an exposure aperture and utilize the cooperating channel and rib structure to provide light sealing means between the magazine and camera member 28. If the exposure aperture and light sealing channel defined by the front casing member 11 are retained, the magazine is supported with edge surface 36 of rib 32 out of supporting contact with the bottom channel surface 35 and out of supporting contact with other surfaces defined by the front casing member. As best shown in Figs. 3 and 4, this is accomplished in this embodiment by providing the camera rib 32 with rearwardly extending projections 41 uniformly located on opposing sides of the objective axis and defining rearwardly facing seating surfaces 42 in predetermined relation to lens 34. When the magazine is inserted, these projections extend rearwardly from rib 32 and freely through corresponding openings 43 located in the front casing member along channel 33, and into supporting contact with forwardly facing seating areas 44 of the same surface that serves to define forwardly facing abutment surfaces 24 and film support surface 21. Accordingly, the relation of the two casing members to one another, as established by cooperating surfaces 23 and 24, need be maintained only within the relatively wide tolerance limitations associated with maintaining the film and

paper in supported engagement with surface 21 with an internal friction constant established by the manufacturer for advancing the film to the take-up chamber. Thus, any variation in the force of spring member 37 will not affect this function.

In accordance with the present invention the critical location of the film support surface 21 relative to the camera lens is defined directly by seating surface areas 44 on the back casing member 12, resiliently held by spring members 37 in the cooperating engagement with seating surfaces 42, on the box-like member 28. Therefore, of the various surfaces defined by the magazine, the only highly critical relation is that of forwardly facing seating areas 44 to the film support surface 21, which relation practicably can be maintained within very close tolerances due to the fact that these surfaces are defined in proximate relation to one another by the same magazine member.

In accordance with the embodiment of Figs. 5—8 a like result is obtained by forming the locating projections on the magazine rather than on the camera. In this embodiment, parts corresponding to or functioning as the parts of the embodiment of Figs. 1—4 have like numbers that are primed.

According to this embodiment of the magazine, the necessity for modifying the presently utilized camera rib structure may be obviated by providing the back casing member with a plurality of forwardly extending projections 41' defining forwardly facing coplanar seating surfaces 44' in predetermined parallel relation to film support surface 21'. Again, if a similar light sealing channel is used, projections 41' are received freely within the corresponding openings 43' and surfaces 44' are located slightly forwardly of the bottom surface 35' of channel 33' when the magazine is assembled. Thus, when the magazine is loaded into the camera and urged toward the lens system by spring members 37' the forwardly facing surfaces 44' engage corresponding rearwardly facing areas 42' of the rearward surface of rib 32', which is received in light sealing relation by channel 33' but maintained out of contact with bottom surface 35' thereof.

Accordingly, the location of the film exposure area relative to the lens system is dependent only upon the locations of surface areas 44' and the corresponding areas along rearward surface areas 42' of rib 32', relative to the film support surface 21' and lens system 34', respectively. To minimize the possibility of distorting the magazine under the influence of spring members 37', it should be noted that pressure pads 38', engaged by the spring members, are located preferably in direct alignment with the corresponding projections 41'. Although projections 41' preferably should fit freely within the corres-

ponding openings 43' to prevent distorting the casing members or influencing the relation of the two members as established by abutment surfaces 23' and 24', the presence of the projections within the openings nevertheless minimizes the possibility of stray light entering the magazine through the openings. To further ensure against this occurrence, it is also possible to provide additional light sealing means, (not shown) for example by forming on member 12', about the base of each projection, a rib adapted to be received by a mating groove in member 11' surrounding the corresponding opening.

WHAT WE CLAIM IS:—

1. A photographic roll film magazine comprising front and back casing members respectively located substantially forwardly and rearwardly of a film support surface integrally defined by the back casing member, and a forwardly facing magazine seating surface or surfaces which engages or engage, when the magazine is in use in a camera, a corresponding rearwardly facing support surface or surfaces of the camera, to maintain the area of film in contact with the film support surface in the focal plane of the camera objective for exposure, wherein the magazine seating surface or surfaces is or are defined by the back casing member of the magazine.

2. A magazine according to claim 1, in which the magazine seating surface or surfaces comprises a plurality of surfaces around the periphery of the film support surface.

3. A magazine according to claim 1 or 2, wherein the magazine seating surface or surfaces comprises or comprise a plurality of projections extending forwardly of the back casing member.

4. A magazine according to claim 3, in which the projections are formed integrally with the back casing member.

5. A magazine according to any one of the preceding claims, in which the magazine includes a continuous light lock channel surrounding the film support surface to receive, when the magazine is inserted in a camera, a continuous projecting rib on the camera body to provide a light seal between the body and the magazine, said channel including a plurality of openings to provide access for engagement of the magazine seating surface or surfaces with the corresponding rearwardly

facing support surface or surfaces of the camera.

6. A magazine according to claim 5 wherein the plurality of projections extend through the channel openings.

7. A photographic roll film magazine substantially as hereinbefore described with reference to, and as shown in Figs. 1 to 4 or Figs. 5 to 8 of the accompanying drawings.

8. A photographic camera arranged to receive a magazine as claimed in claim 1 and comprising a lens, a box-like member defining an exposure gate perpendicular to the optical axis of the lens and whereat, in use, film on the film support surface of the magazine, may be exposed and wherepast film may be transported, intermittently to locate, sequentially, unexposed areas of film in the exposure gate, the box-like member comprising a rib surrounding the gate; the rib being arranged to co-operate, in use, with a channel defined by the front casing member of the magazine to form therewith a light-tight seal peripherally of the exposure gate; the rib having rearwardly projecting members laterally disposed relative to the path of film transportation, the rearwardly projecting members having rearwardly facing support surfaces arranged to engage, when the magazine is in use in the camera, the forwardly facing seating surface or surfaces of the back casing member of the magazine to maintain an area of film on the film support surface integrally defined by the back casing member of the magazine, in the focal plane of the lens of the camera.

9. A camera as claimed in claim 8 further including springs for resiliently urging, in use, the forwardly facing seating surface or surfaces of the magazine into engagement with the rearwardly facing support surface or surfaces of the camera.

10. A camera as claimed in claim 9 wherein the springs are provided on the camera back and are arranged to engage the magazine in direct alignment with the rearwardly facing support surfaces.

11. A photographic camera substantially as hereinbefore described with reference to and as illustrated in Figs. 1 to 4 of the accompanying drawings.

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