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DRAWINGS ATTACHED

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(54) REEL FOR FLEXIBLE WEB MATERIAL

(71) We, EASTMAN KODAK COMPANY, 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 a reel for flexible web material, such as motion picture film.

In accordance with the present invention there is provided a reel for a web of flexible material, comprising a hollow member on which the web may be wound, the hollow member having a threading slot extending therethrough for threading the end of the web into the interior of the member, a web-retaining pin connected to the hollow member by frangible means, and a socket disposed in the interior of the hollow member and formed integrally with this member for receiving both the end of the web and, when it has been separated from the hollow member, the retaining pin.

In the accompanying drawings:—

Figure 1 is a perspective view of a supply reel having a film retaining means constructed in accordance with the present invention;

Figure 2 is a rear elevation of the reel shown in Figure 1;

Figure 3 is a front elevation of the hub portion of the reel shown in Figure 1;

Figure 4 is a perspective view of the reel with a portion thereof broken away, showing the manner in which the film end is threaded into the film retaining means;

Fig. 5 is a fragmentary side elevation of the reel, partly in section, to show the film secured by the retaining pin and the manner in which the pin is retained in its socket after the film has taken a set about the pin;

Figs. 6 and 6A are perspective views, to an enlarged scale, of the film retaining pin;

Fig. 7 is a perspective view of the reel positioned in a cartridge;

Fig. 8 is a fragmentary side elevation, in section, showing the relative sizes of the central openings in the cartridge, and the orienting function of the retaining pin;

Fig. 9 is a fragmentary section, to an enlarged scale, of the retaining pin socket showing the film inserted therein; and

Fig. 10 is a fragmentary section, to an enlarged scale, of the retaining pin socket showing the retaining pin inserted therein.

Referring to the drawings, a supply reel 10 is disclosed comprising a hub 11 and front and back side-flanges 12 and 13, respectively, extending radially outwardly from the periphery of hub 11 and spaced along the hub axis by a distance slightly greater than the width of film or other elongated material to be received on the reel 10. The hub has a peripheral wall defining an outer surface 14 (Fig. 4) for supporting the film convolutions and an inner surface 15 from which arms 16 extend radially inward to a central core 17 having a central opening for receiving the spindle of a movie projector (not shown). Side-flange 12 of the reel 10 has a radial break 18 therein to facilitate insertion of film in a film threading opening 19 in the peripheral wall of hub 11.

In Figures 2 and 3, one embodiment of a film retaining means in accordance with the present invention is disclosed. This means comprises a film retaining pin 20 and a pin receiving socket 21 which are moulded or formed as an integral part of reel 10 on the inner surface 15 of the hub 11. As one feature of the embodiment disclosed, pin 20 and socket 21 are moulded in one operation and as one piece with the supply reel 10, so that the pin 20 is attached to the reel 10 at an otherwise unused portion of the reel hub 11 by means of a thin, frangible connecting web 22. Socket 21, on the other hand,

is located near and is formed by part of a radial arm 16 in such a manner that it will receive added support and rigidity therefrom. However, as would be obvious to one skilled in the art, other features of the invention are not dependent on such integral moulding and the pin and socket can be separately formed if desired to achieve such other features.

The particular shape of retaining pin 20 is most clearly shown in Figs. 6 and 6A. More specifically, the pin 20 has an asymetrical cross section defining a relatively thick elongated portion 23 having a narrower film engaging edge portion 24 projecting therefrom along the length thereof and defining a convexly curved film engaging edge surface (*a*). The pin also defines a flat recessed surface along the portion 23 which defines a small convexly curved film engaging surface (*b*) adjacent to the bight of the surface (*a*).

The pin 20 further defines flat sides 25 and a flat edge portion 26 for properly aligning the pin 20 in the socket 21. On one flat side 25 of the pin 20 there is located a stop member 27 having a forward end 28, the function of which will be described more fully hereinafter.

The bight portions of the surfaces (*a*) and (*b*) of pin 20 are located substantially half way between the forward end 28 of stop member 27 and the tip end 31 of the pin 20, the distance between the forward end 28 of the stop member 27 and the tip end 31 of the pin being approximately equal to the axial length of the hub 11. With this arrangement, the surfaces (*a*) and (*b*) exert maximum pressure on the central portion of the film as will later be described in more detail.

Referring again to Figs. 1, 2 and 9, socket 21 comprises a protuberance 33 extending along the inner surface 15 of the hub 11 and a portion 34 of one of the radial arms 16. The protuberance 33 and portion 34 extend along the axial length of the hub 11 and are located on opposite sides of and define an extension of the retaining slot 19, but are close enough together to produce a light frictional retaining effect on a film threaded therethrough in the manner indicated in Fig. 9.

For receiving portion 23 of the pin 20, the protuberance 33 defines a slot 35 along substantially the entire axial length of the hub. The portion 34 of radial arm 16, on the other hand, contains a similar but narrower slot 36 for receiving the portion 24 of the pin 20. It will be apparent that the arrangement of slots 35 and 36 is such that the pin 20 can be inserted into the socket 21 only when the portions 23 and 24 of the pin are aligned with the slots 35 and 36.

Referring in detail to Fig. 9, the socket 21 defines an abutment or film alignment means comprising lips 37 and 38 on the side from which the film is inserted. More specifically, the lip 37 is defined by the protuberance 33 on one side of the slot 19 at the lower end thereof while the lip 38 is defined by the portion 34 on the same side of the slot 19 as the portion 34 along the length thereof as viewed in Fig. 9. Because of the tendency of the film to remain substantially straight, and the position of the core 17, which urges the film to one side (the right-hand side as viewed in Fig. 9), the edge of the film will engage the edges of lips 37 and 38. This will effectively trap the film such that it will not be pushed out of the core when the retaining pin is inserted from the opposite side.

In operation of the retaining means, a strip of film is inserted into the retaining slot 19 and between protuberance 33 and portion 34 of socket 21 as shown in Fig. 9. After the film has been wound on to the reel, for example in the film processing laboratory or on a projector, pin 20 is inserted into socket 21, until stop member 27 abuts against the edge of protuberance 33, thereby locking the film to the reel. As the pin 20 is inserted into the socket 21 the projecting edge portion 24 forces a portion of the film into the slot and bends it into a bulged U-shaped configuration within the slot 36 as shown in Fig. 10. The U-shaped portion of the film thus formed in the slot 36 will selectively engage the side and bottom wall surfaces of the slot 36, the edges of the surface (*a*) and the side surfaces of the edge portion 24, depending on the radii of the film bends thus formed. In addition the curved surface (*b*) of the pin 20 will engage and force the portion of the film immediately below the slot 36 (as viewed in Fig. 10) against the surface of portion 34 of arm 16 to thus establish frictional retention of said film portion. The frictional retaining force thus established by surface (*b*) and the adjacent surface of portion 34 tends to supplement the effective frictional retaining force established by portion 24 and slot 36. When the film is subjected to a pulling force tending to remove it from the socket 21, the frictional retaining force established by surface (*b*) adds to the frictional resistance established by surface (*a*) and the surfaces of slot 36.

Since, as previously described, the bight portions of the surfaces (*a*) and (*b*) are halfway between the forward end 28 of stop 27 and the end 31 of pin 20, the frictional retaining pressure between said surfaces and the film will be greatest at the centre portion of the film. This not only reduces the chance of film tear, but also acts to retain the pin 20 in operative position even after the film has relaxed or taken a set about the pin, as shown in phantom in Fig. 5 where the film is depicted as it might appear after it has deformed about the curved edge of the pin.

Stop member 27 also serves to prevent the entire pin length from being inserted into the socket 21, such that an extended portion 39 (Figs. 7 and 8) of the pin may be used to insure proper orientation of the supply reel when it is placed in a reel cartridge 50 or other compartment adapted to permit rotation of the reel relative thereto. As shown in Figs. 7 and 8, such a cartridge has openings 40 and 41 for receiving a reel spindle of a motion picture projector. Opening 40 is shown as having a greater radius than the distance between extended portion 39 of pin 20 and the centre of revolution of reel 10. Thus, when the reel is properly inserted into the cartridge, as shown in Fig. 7, the pin 20 will extend through the opening 40 and the reel will rotate freely. On the other hand, opening 41 has a smaller radius than opening 40. If it is attempted to insert the reel into the cartridge 50 improperly, interference between the pin and the edges of opening 41 will result.

In the particular embodiment disclosed, the extended portion 39 of the pin 20 projects from the back side of the reel 10 and cartridge 50. This orientation is preferable since there is usually more wall thickness on the back side of the cartridge, and the extended portion will not project beyond the wall surface of the cartridge. Moreover, since the film perforations are on the opposite side, the pin is inserted against the side of the film which will take the most abuse. However, it will be obvious to those skilled in the art, that the pin could be inserted from either side of the reel, if the reel is constructed accordingly, and that the extending portion 39 could extend from either side of the reel.

It should also be obvious to those skilled in the art that the disclosed retaining means could be used in tape recorders, computers and other devices where it is desired to secure a strip of material to a reel.

In Patent Application No. 55783/68 (Serial No. 1,255,160) there is claimed a reel for a web of flexible material comprising a spindle-engaging core on which the reel may be mounted for rotation about its axis, and an annulus coaxially supported by the core and on which the web may be wound, the annulus having a slot which extends parallel to the reel axis and into which the leading end of the web may be inserted to extend between spaced first and second walls which depend inwardly from the annulus towards the core at respective sides of the slot, the first and second walls together defining a socket which extends parallel to the reel axis and is open at one end for the longitudinal insertion therein of a complementary elongated web retaining member, in combination with such a web retaining member, the web retaining member being removable longitudinally from the socket to permit the leading end of the web to be inserted through the slot and socket and being adapted, when then inserted in the socket, to engage and deform the leading end in the socket and frictionally to retain this leading end therein.

WHAT WE CLAIM IS:—

1. A reel for a web of flexible material, comprising a hollow member on which the web may be wound, the hollow member having a threading slot extending therethrough for threading the end of the web into the interior of the member, a web-retaining pin connected to the hollow member by frangible means, and a socket disposed in the interior of the hollow member and formed integrally with this member for receiving both the end of the web and, when it has been separated from the hollow member, the retaining pin.

2. A reel as claimed in Claim 1, wherein the retaining pin and socket have been moulded in one piece with the hollow member.

3. A reel according to Claim 1, constructed and adapted for use substantially as hereinbefore described with reference to, and as shown in, the accompanying drawings.

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