Nov. 5, 1940. E. S. MILLER 2,220,610

MOTION PICTURE REEL MOUNTING

Filed April 3, 1939

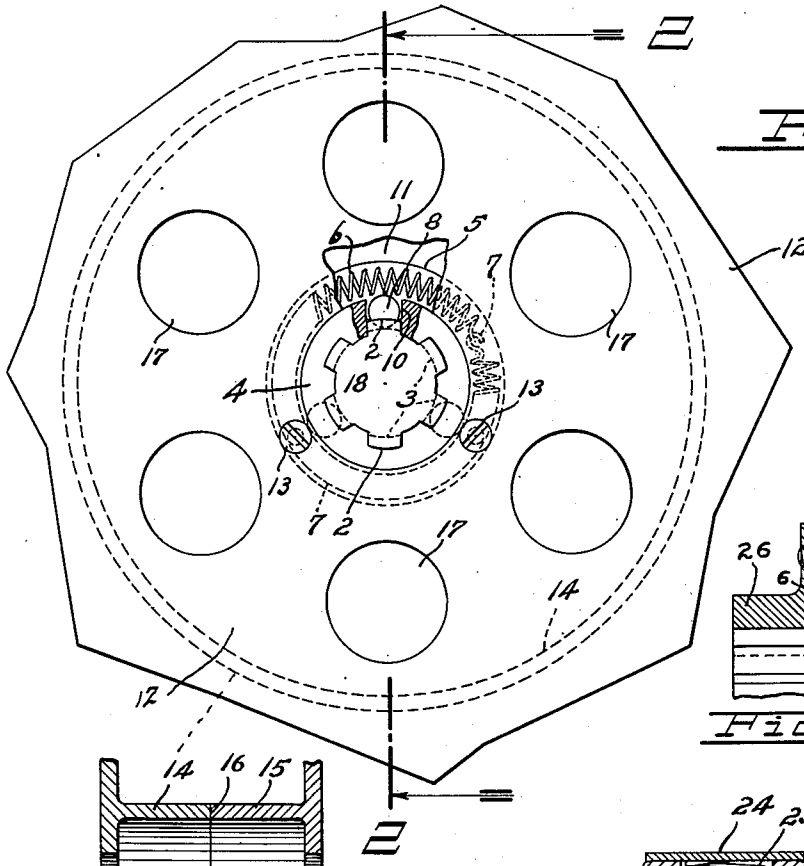


Fig. 1.

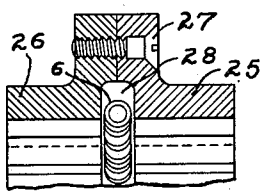


Fig. 4.

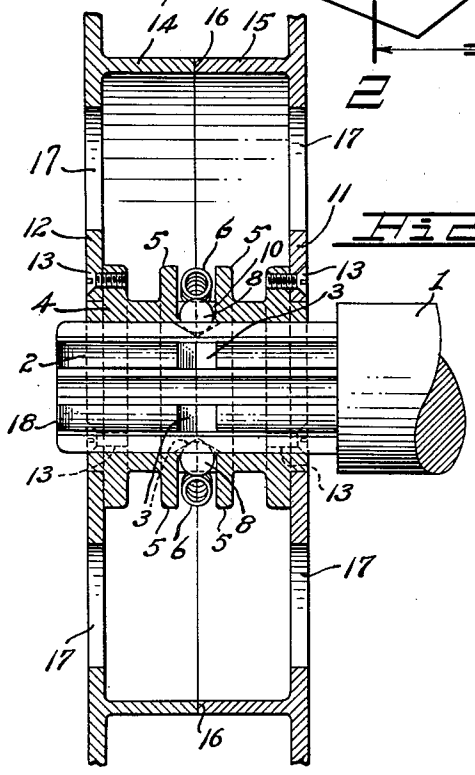


Fig. 2.

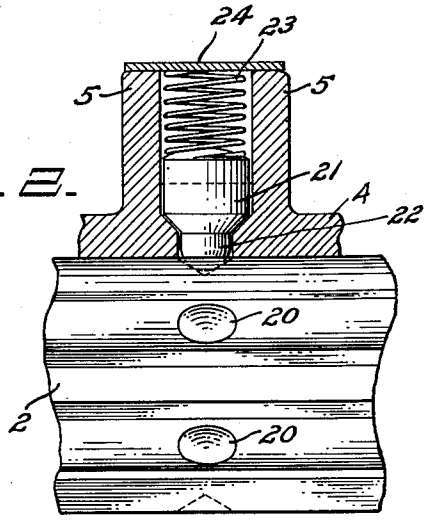


Fig. 3.

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MOTION PICTURE REEL MOUNTING

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6 Claims. (Cl. 242—70)

This invention relates to motion picture reel mountings and the object of the invention is to provide a mounting for locking a motion picture reel on the reel spindle and to provide a strong and positive driving connection between the reel and the spindle.

A further object of the invention is to provide a locking means which will also align the center of the reel with the projection apparatus so that the film is always in proper alignment with the feed mechanism.

A further object of the invention is to provide a film reel having a splined hub arranged to fit over a splined spindle and provided with means in the hub engaging in recesses in the splines for locking the reel to the spindle and aligning the center of the reel with the center of the feed mechanism of a motion picture projector.

Another object of the invention is to provide a motion picture reel mounting which may be easily and quickly removed from or attached to the spindle without the necessity of adjusting the reel on the spindle for alignment.

A further object of the invention is to provide a splined spindle having recesses in the splines to receive locking and centering members and the locking and centering members being backed up with spring means to urge the same into engagement with the recesses in the splines.

Another object of the invention is to prevent looseness between the reel hub and spindle by the use of a splined spindle and a splined hub to increase the bearing surfaces between the spindle and hub and provide a strong and positive driving connection which will not tend to wear or become loose:

These objects and the several novel features of the invention are hereinafter more fully described and claimed and the preferred form of construction by which these objects are attained is shown in the accompanying drawing in which—

Fig. 1 is an elevation of a motion picture reel mounting partly broken away to show the construction.

Fig. 2 is a section taken on line 2—2 of Fig. 1.

Fig. 3 is an enlarged view similar to Fig. 2 showing an alternative form of locking and centering member.

Fig. 4 is a section illustrating another alternative form of the device.

The usual motion picture projecting machine has a spindle for the film reel which usually is a cylindrical spindle provided with a key slot having a key over which the film reel hub fits. This type of construction has been sufficient for the usual small film reels formed of stamped sheet metal and carrying up to one thousand feet of motion picture film. However, with the improvements of the last few years in motion pictures, the tendency has been to produce die cast film reels of large capacity having considerable weight with the film wound thereon and the result has been that a great amount of strain is put on the key.

With the present high speed re-winding devices, the load carried by the spindle and key when rotating at a rapid re-wind speed is very apt to break the key or damage the reel hub or cause wear and consequent looseness between the spindle and reel hub. Also in the previous types of spindles the locking device for locking the reel on the spindle is mounted on the end of the spindle and very often is struck and broken and as these former types of locking devices always seated the reel against a spindle shoulder the difference in width of a die cast reel over a stamped sheet metal reel would prevent the reel from being moved into position to align the film thereon with the feed mechanism for the film. It is an object of my invention to provide a combination film reel and spindle whereby the film is automatically centered in relation to the spindle and in relation to the feed mechanism irrespective of the width of the reel or reel hub.

In order to provide suitable driving strength, I have provided a spindle 1 shown in Fig. 2 having a splined end 2. A series of V-notches 3 are cut into the splines as shown in Fig. 2 by milling the notches into the splines or by placing the splined end in a lathe and cutting the V-notches 3 in the splines. These notches are shown as being V-shaped in cross section but may be of any other desired shape and the notches are aligned circumferentially about the splined end in a plane transverse to the axis of the spindle.

These notches 3 are for the purpose of centering and locking the film reel hub on the splined spindle. The hub member 4 of the film reel is splined to fit over the splines of the spindle and is provided with annular spaced flanges 5 about the center acting as retainers for the coiled spring 6. The ends of this spring 6 are hooked together at 7 as shown in Fig. 1 and the spring engages against the locking balls 8 as shown in Figs. 1 and 2. Three of these locking balls are provided in the form shown in Figs. 1 and 2, though a locking ball may be provided for each spline if so desired. These balls fit in apertures 10 which extend through the reel hub 4 so that the balls may engage in the V-notches 3 in the spindle splines as shown in Fig. 2 and it is important that the balls be in the exact center of the film reel hub. Side plates 11 and 12 are secured to the opposite ends of the reel hub 4 by the screws 13 and each side plate is provided with inturned flanges 14 and 15 having edges 16 which engage together as shown in Fig. 2 and provide a seat for the film which is wound thereon. The side plates 11 and 12 are provided with finger apertures 17 as shown in Figs. 1 and 2 and these side plates may

be extended to any desired diameter to hold any quantity of film.

In use, the film reel with the film wound thereon may be slipped over the spindle by fitting the splined hub 4 over the splined end of the spindle until the locking balls 8 snap into the V-shaped notches 3 in the spindle splines.

When these balls snap into position, the film reel is locked to the spindle and as the balls engage the angular faces of the V-notches they center the film reel on the spindle so that if the V-notches 3 are cut in the proper position and the locking balls 8 are in the exact center of the film reel hub the film will be aligned perfectly with the projector feed mechanism. When it is necessary to remove the film reel, the operator may insert his fingers through the apertures 17 in the outer side plate and by pressing with his thumb on the end 18 of the splined spindle he may easily pull the reel off from the splined spindle causing the balls to disengage from the notches 3. By the use of the splined spindle and splined reel hub the reel and spindle are locked together as a unit and the pressure applied to the spline surfaces even by high speed re-winding with a large loaded reel will not appreciably wear or break down the connection between the reel and spindle. As the locking device is concealed within the hub of the film reel, it cannot be damaged as it is not exposed to knocks or blows and, at the same time, the film reel may be quickly removed or replaced on the spindle.

An alternative form of construction is shown in detail in Fig. 3 in which form the splines on the splined end 2 of the spindle are provided with conical recesses 20. In Fig. 3, a locking member 21 is shown having a rounded end 22 for engagement in the recesses 20 and coiled springs 23 engage these members 21 and urge them into their recesses.

These springs 23 may be backed up by an annular cover plate 24 fitted over the hub flanges 5 as shown. In this form shown in Fig. 3, the locking members are of different form and the recesses are of different form than that shown in Fig. 2 but the principle of operation is the same and this arrangement will center and lock the film reel on the spindle as well as the form shown in Fig. 2. In the form of the device shown in Fig. 4, the splined hub is formed of two parts 25 and 26 which are secured together by screws 27. These hub parts are so formed as to provide an annular channel 28 in which the coiled spring 6 is positioned. When this form of hub is slipped over the splined end of the spindle, the spring 6 itself contracts and engages in the aligned notches 3 in the spindle splines to center and lock the hub to the spindle.

From the foregoing description it becomes evident that the device is very simple and efficient in operation, will not easily get out of order, cannot be easily damaged, will align the film reel with the projection mechanism and lock it on the spindle at the same time and provides a device which accomplishes the objects described.

Having thus fully described my invention, its utility and mode of operation, what I claim and desire to secure by Letters Patent of the United States is:

1. In a reel mounting, a reel spindle having an end provided with a plurality of splines, each of the splines having a recess in its outer face and the recesses of the several splines being in circumferential alignment around the spindle axis, a film reel having a splined hub fitting the splined end of the spindle, certain of the recesses between the splines of the hub opening through the exterior surface of the hub, a ball in each of the said recesses of the hub opening through the hub surface and engaging in the recess of the respective spline of the spindle, and spring means for holding the balls in the respective spline recesses.

2. A reel mounting comprising a spindle having a plurality of splines, each of the splines having a recess in its outer face and the recesses of the several splines being in circumferential alignment around the spindle axis, a reel having a splined hub fitting the splined portion of the spindle, certain of the recesses between the splines of the hub having openings through the exterior of the hub, means in the said recesses opening through the hub for engaging the recesses of the respective splines of the spindle, and spring means engaging the last named means.

3. A reel mounting comprising a spindle having a plurality of splines, a reel having a similarly splined central hub for engagement therewith, the splines on the spindle having recesses in their outer faces, and at least one of the spaces between the splines on the hub opening through the periphery of the hub, a means in the said one space for engaging the recess in the respective spline of the spindle, said hub having a peripheral flange on each side of the said space opening through the hub periphery providing an annular recess, and a spirally coiled spring in the annular recess yieldably supporting the said means engaging the spline recess from material displacement.

4. A reel mounting comprising a spindle having a spline, a reel having a central hub formed to receive the spindle spline, the spline on the spindle having a recess in its outer face, and the hub having an opening through its periphery diametrically aligned with the spindle recess, a means in the said hub opening for engaging the recess in the spline, and a spring releasably supporting the said means in engagement with the spline recess.

5. A reel mounting comprising a spindle having splines, a reel having a similarly splined central hub for engagement therewith, the splines on the spindle having recesses in their outer faces, and at least one of the spaces between the splines on the hub opening through the periphery of the hub, a means in the said space for engaging the recesses in the spindle splines, and a spring releasably supporting the said means in engagement with the spline recess, said hub having an annular recess aligned with the said space opening through the periphery of the hub and said spring being in the annular recess for releasably supporting said means engaging the spline recess.

6. A mounting for a motion picture reel, comprising a rotatable shaft having an end provided with integral splines, a reel having a splined hub closely engaging the shaft splines whereby the shaft and reel are rotatable as a unit without lost motion therebetween, the outer face of at least one of the splines of the shaft having a recess, radially displaceable means carried by the hub for engaging said resess and yieldably preventing displacement of the reel longitudinally of the shaft, and a spring means carried by the hub and releasably holding the said radially displaceable means in position in the recess.

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