

W. I. TUTTLE.
 REEL CONSTRUCTION AND METHOD OF HANDLING WEBS.
 APPLICATION FILED SEPT. 30, 1916.

1,337,418.

Patented Apr. 20, 1920.

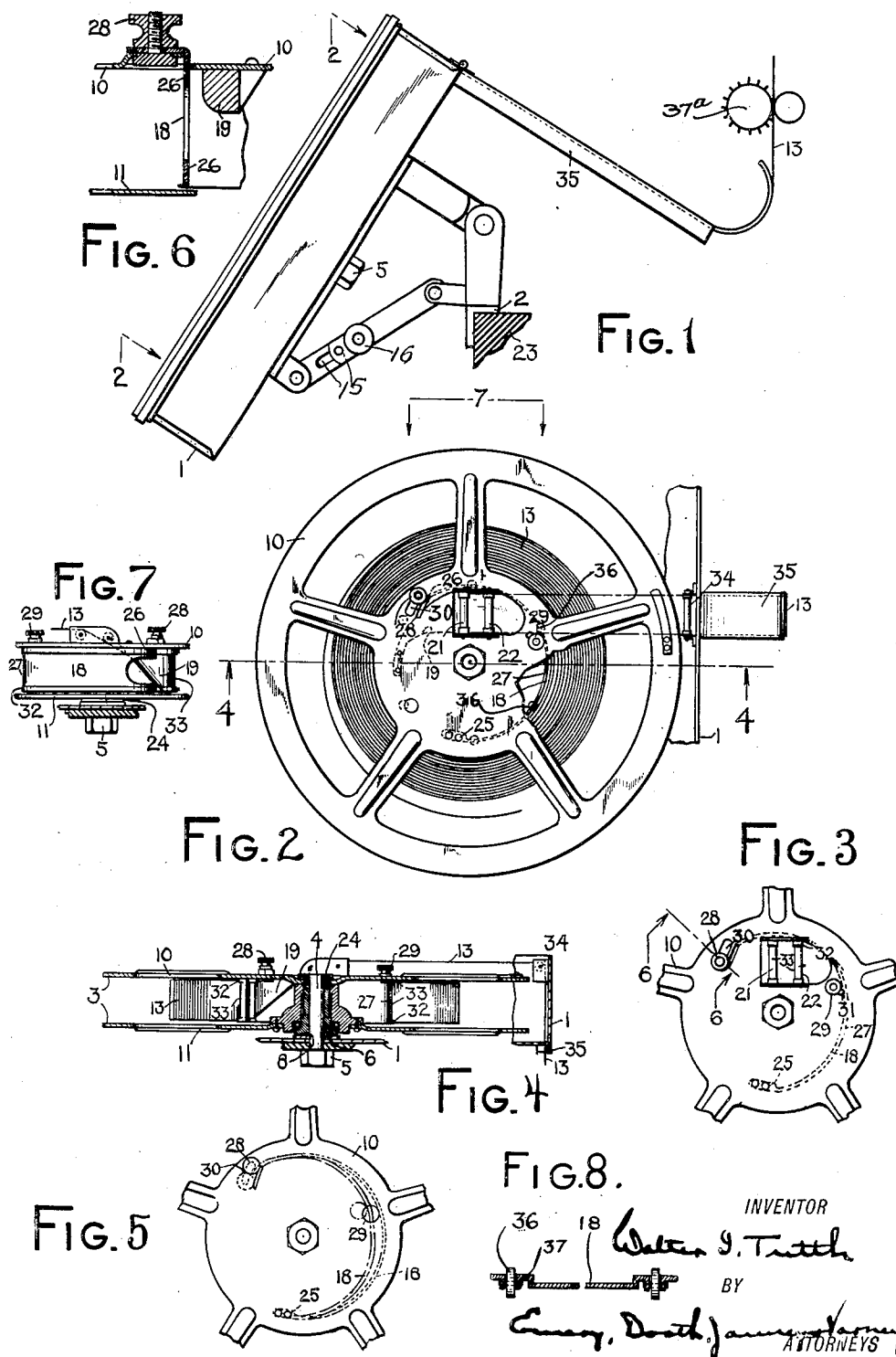


FIG. 8.
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REEL CONSTRUCTION AND METHOD OF HANDLING WEBS.

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Specification of Letters Patent.

Patented Apr. 20, 1920.

Application filed September 30, 1916. Serial No. 122,974.

To all whom it may concern:

Be it known that I, WALTER I. TUTTLE, a citizen of the United States, and a resident of Providence, in the county of Providence and State of Rhode Island, have invented an Improvement in Reel Construction and Methods of Handling Webs, of which the following is a specification.

This invention relates to reel construction and method of handling webs, and with regard to certain more specific features, to an apparatus for and method of handling motion picture film.

One of the objects of the invention is to provide a reel mechanism which shall be of simple construction and efficient and reliable action.

Another object is to provide an inexpensive and compact reel in which the danger of damaging the film by scratching or otherwise, as well as the liability of having the film catch or lock during the unwinding operation, is minimized or eliminated.

Another object is to provide improved apparatus of this general type, in which the reel upon which the web or film is wound is used directly for unwinding the film into the motion picture machine for another exhibition, by drawing outwardly through the reel mechanism the inner or leading end of the wound film.

Another object is to provide a mechanism of the above general type in which the parts are arranged and proportioned to minimize the wear and tear on the film without sacrifice of simplicity of construction or low cost of manufacture.

Another object is to provide a reel comprising an expansible hub, which upon the completion of the winding operation, may be contracted and secured in its contracted position in order to loosen the inner convolution of film and thereby facilitate unwinding.

Another object is to provide an inexpensive and reliable method of handling webs in such a way as to obviate the necessity of rewinding the web between exhibitions, and at the same time to protect the web from injury during the winding and unwinding of the reel.

Another object is to provide an inexpensive and efficient construction of the above nature enabling the parts to be easily as-

sembled and readily disassembled in case of inspection or repair.

Other objects will be in part obvious, and in part pointed out hereinafter.

The invention accordingly comprises the features of construction and operation, combinations of elements, arrangements of parts, and sequences of steps which are exemplified in the structure hereinafter described, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings, in which is shown one of various possible embodiments of this invention,

Figure 1 is an elevation of a magazine in position ready for unwinding;

Fig. 2 is a face view of the reel, taken in the direction indicated by arrows 2 of Fig. 1, with parts broken away to show more clearly the interior structure, and illustrating the hub expanded;

Fig. 3 is a fragmentary view similar to Fig. 2, but showing the hub contracted;

Fig. 4 is a sectional view on the line 4—4 of Fig. 2;

Fig. 5 is a detail of the expanding-hub construction.

Fig. 6 is an enlarged sectional view on the line 6—6 of Fig. 3;

Fig. 7 shows the hub and associated parts, viewed in the direction of the arrows 7, Fig. 2.

Fig. 8 is an enlarged cross section of a hub.

Similar reference characters indicate similar parts throughout the several views of the drawings.

This invention relates to reel construction and method of handling webs, and particularly to motion picture films, which are ordinarily in the form of a comparatively delicate transparent web some hundreds of feet in length, and are used by being repeatedly fed through suitable projecting apparatus. In the ordinary method of handling such films, the film is unwound from the outer turn or convolution of a delivery reel, is then fed through the projecting apparatus, and afterward wound upon a similar receiving reel, with the leading end of the film at the inner turn of the reel. In order to use the film again, it is thus first necessary, with the usual prior-art apparatus, to rewind the film from the receiving

reel onto the delivery reel, so that the leading end of the film, which will be the last part of the film to be thus rewound, will be at the outer turn of the delivery reel, ready
 5 for threading first through the projecting apparatus. A number of attempts have been made to obviate the necessity for this rewinding of the film between exhibitions, and it is to such non-rewinding apparatus
 10 that the present invention relates.

Referring to the accompanying drawings, there is shown at 1 a magazine adapted to be mounted upon the frame of a motion picture projecting apparatus by means of the bracket 2. During the unwinding operation,
 15 the reel 3 is mounted on the central shaft 4 in this magazine 1; the shaft is provided with a lock nut 5 to prevent its rotation, and a pin or key 6 projecting from the shaft 4 engages the radial slot 8 in the
 20 reel and prevents the upper or hub-carrying disk 10 thereof from rotating during the unwinding operation. A feeding sprocket or other device (not shown) serves
 25 to pull the film from the reel into the projection apparatus. The lower disk 11 is free to rotate, and bears the weight of the film coil 13, owing to the slanting position of the reel and magazine. The angle that the reel
 30 makes with respect to a horizontal position may be adjusted by means of the telescoping slots 15 and thumb nut 16 (Fig. 1) forming part of the bracket by which the magazine is mounted upon the frame of the
 35 projecting apparatus 23.

In winding the film after it has passed through the projecting apparatus 23, the leading or inner end of the film is manually drawn over the expanding hub 18,
 40 which at this time is in its expanded position illustrated in Fig. 2, and is then drawn around the cam-guide 19 and outwardly through the upper disk 10, between the two guiding rollers 21, 22. The leading end of
 45 the film may be secured to the outer face of the disk 10, if desired, by any suitable means. During the winding operation, the reel is mounted on a horizontal shaft (not shown) which is positively driven from a
 50 suitable source of power usually connected with the operating mechanism for the projection apparatus, in such a way that the shaft and with it the reel is rotated at a sufficiently high speed to wind the film as
 55 it is delivered from the projection apparatus 23, a suitable slip drive being provided to prevent excessive tension on the belt as the winding progresses. As the projection apparatus is operated, the film will
 60 thus be wound upon the reel, and when the winding has been completed, the final end of the film will be at the outer convolution of the coil wound on the reel, while the leading end of the film, which must be

passed first through the projection apparatus during the next exhibition, is at the inner turn of the film and has been drawn over the cam guide 19 and between the guide rollers 21 and 22 as above described. This leading end of the film is thus available for feeding through the projection apparatus by unwinding from the inner turn of the film coil without requiring any preliminary rewinding operation.

After this winding has been completed, the reel, with the film wound thereon, may be stored until it is again wanted. Then the reel is placed upon the central shaft 4 within the magazine 1, with the hub-carrying disk 10 above the lower disk 11, as indicated
 80 in Fig. 4 of the accompanying drawings. The pin or key 6 on the fixed magazine shaft 4 engages the radial slot 8 in the reel 3, and prevents rotation of the upper disk 10 during the unwinding operation, since
 85 said disk 10 is secured to the central hollow shaft 24 in which said slot 8 is cut. Ball-bearings are provided in order to minimize friction, as indicated in Fig. 4.

Since the film was wound onto the reel
 90 under some tension, the inner convolutions of the film are usually wound fairly tightly, and if the unwinding operation were to be started with the inner coil having the same diameter that it has during the winding
 95 operation, considerable strain would be put upon the film, with possibly a resultant breaking or scratching of the film as it is unwound. In order to obviate this trouble, the hub 18, preferably of arcuate shape, is
 100 secured to the upper disk 10 at one end 25 only, while at its other end 26 and preferably also at an intermediate point 27, set screws 28, 29 respectively, are attached to brackets fixed to the hub, and these set
 105 screws can be secured in any given position within certain limits by means of slots 30, 31 in the disk 10. With the set screws in the outer or expanded position indicated in Fig. 2, the hub has its maximum diameter,
 110 while when the set screws 28, 29 are at the opposite or contracted position indicated in Fig. 3, the hub 18 has its minimum diameter. By securing the set screws in such a way as to afford a maximum diameter
 115 for the hub during the winding operation, it is possible, just prior to the unwinding operation, to shift the set screws to the opposite end of their stroke, thus contracting the hub, and reducing the effective di-
 120 ameter of the reel, and affording the desirable looseness of the inner convolution of the film coil, and thereby reducing the tension needed to unwind the film and minimizing or eliminating danger of scratching or
 125 tearing the film during the unwinding operation.

Preferably the hub 18, cam guide 19, and

guide rollers 21, 22, are provided with lateral shoulders 32 and a central recess 33, as indicated in Figs. 2, 3 and 4, so that only the edges of the film will contact with the hub. In this way the pictures, which do not extend to the sides of the film, are protected from scratching. Similar recessed portions are provided in the roller 34 and pivoted guide 35, which are mounted upon the magazine 1 and serve to guide the film in its passage from the reel to the projection apparatus.

As best shown in Fig. 8 of the drawings, the raised portions at the sides of the hub 18 are provided with rollers 36 upon which the film rests. These rollers are preferably journaled between ears or lugs 37 stamped downwardly from the metal of the hub. By this means the travel of the film over the hub is much facilitated and it is to be understood that several sets of rollers are provided, spaced one from another about the hub.

The guide 35 is pivotally mounted upon the magazine 1, as indicated in Fig. 1, in order that it may assume the most advantageous angle for guiding the film from the magazine to the projection apparatus during the unwinding operation and afford a flexible guide for directing the film from the reel to the feed sprocket 37a.

It is believed that the operation of the apparatus and the sequence of the several steps in the method features of this invention, will be clear from the above without further elaboration.

From the above, it will be seen that there is provided apparatus in which the objects of the invention are realized, and other advantageous results obtained.

As various changes might be made in the above construction, and as the above invention might be embodied in different forms, it is intended that all matter set forth in the above description and in the accompanying drawings, shall be interpreted as illustrative and not in a limiting sense.

I claim as my invention:

1. In apparatus of the class described, in combination, a disk, a hub mounted thereon, a second disk co-axial with the first, means for positively unwinding a film therefrom from its inner turn, and means for reducing the diameter of the hub prior to the unwinding operation.

2. In apparatus of the class described, in combination, a disk, a hub mounted thereon, a second disk co-axial with the first, a curved guide adjacent said hub and adapted to guide a film being unwound from its inner turn under tension, and means for reducing the diameter of the hub prior to the unwinding operation.

3. In apparatus of the class described, in

combination, a pair of spaced disks, a member between them for supporting the inner turn of the film, means for permitting the withdrawal of the film from the disks by positively unwinding from the inner turn of the film, and means for adjusting the effective diameter of said member.

4. In apparatus of the class described, in combination, a pair of spaced disks, an arcuate member between them forming a hub for the inner turn of the film, means permitting the withdrawal of the film from the disks by unwinding from the inner turn of the film under tension, and means for adjusting the effective diameter of said hub.

5. In apparatus of the class described, in combination, a carrier for holding a coil of film, coil-unwinding means exerting a pull upon the innermost convolution of the coil, and means for reducing the diameter of the inner coil prior to the unwinding operation.

6. In apparatus of the class described, in combination, a freely rotatable carrier for holding a coil of film, means for pulling upon the innermost convolution of the coil to unwind the same from the center, a member determining the diameter of said innermost convolution during the winding operation, and means for reducing the effective diameter of said member prior to the unwinding operation, to loosen the inner convolutions of the film.

7. In apparatus of the class described, in combination, a carrier for supporting a coil of film, a guide device located adjacent the inner convolution of the coil, for guiding the film as it is unwound under tension from its center, a member determining the inner diameter of the coil during the winding operation, and means for simultaneously increasing the angular displacement of said member and decreasing its effective diameter prior to the unwinding operation, to loosen the central convolution of the film for the unwinding operation.

8. In apparatus of the class described, in combination, a revoluble film holder centrally apertured, a stationary support therefor, said support having a film-guiding slot thereon, film-guiding means arranged to guide the film under tension from the inner turn of the film coil toward said slot, and means for reducing the effective diameter of the inner turn of the film coil after the winding operation and prior to the unwinding operation, the parts of which the film contacts being channeled to protect the pictures on the film.

9. In apparatus of the class described, in combination, a reel, means permitting the withdrawal of the film from the reel by unwinding from the inner turn of the film, a magazine, means within said magazine for mounting said reel during the unwinding

operation, a slot in said magazine for the passage of the film from the reel to the projection apparatus, means for adjustably mounting the magazine upon the projection apparatus and for securing the magazine with the reel at the desired angle to the horizontal, and a flexible guide for directing

the film from said slot toward said projection apparatus.

In testimony whereof I have signed my name to this specification this fifteenth day of September, 1916.

WALTER I. TUTTLE.