Oct. 2, 1928. 1,685,904

J. L. BURKE

REEL CONSTRUCTION AND LENGTH MEASURING MEANS

Filed March 2, 1921 2 Sheets-Sheet 1

Fig. 1.

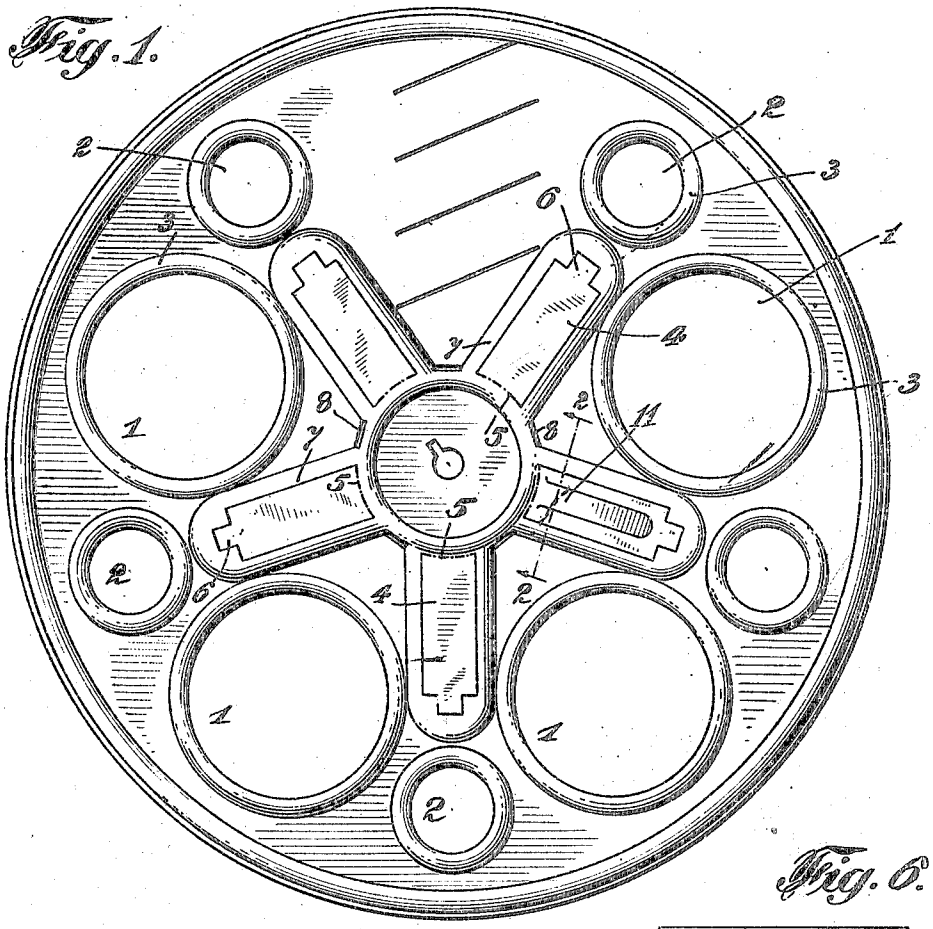



Fig. 6.

| I | | II | | III | |
|---|---|---|---|---|---|
| A | 66 Ft. | A | 190 Ft. | A | 212 Ft. |
| B | 69 " | B | 195 " | B | 224 " |
| C | 73 " | C | 140 " | C | 230 " |
| D | 77 " | D | 145 " | D | 236 " |
| E | 81 " | E | 150 " | E | 242 " |
| F | 85 " | F | 155 " | F | 248 " |
| G | 89 " | G | 160 " | G | 254 " |
| H | 93 " | H | 165 " | H | 260 " |
| I | 97 " | I | 180 " | I | 266 " |
| J | 101 " | J | 125 " | J | 272 " |
| K | 105 " | K | 180 " | K | 278 " |
| L | 109 " | L | 185 " | L | 284 " |
| M | 113 " | M | 190 " | M | 290 " |
| N | 117 " | N | 195 " | N | 297 " |
| O | 121 " | O | 200 " | O | 304 " |
| P | 125 " | P | 206 " | P | 311 " |

Fig. 2.

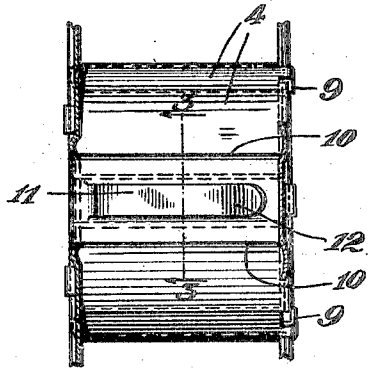
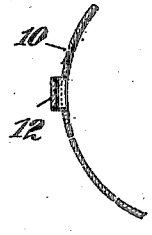



Fig. 3




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REEL CONSTRUCTION AND LENGTH MEASURING MEANS

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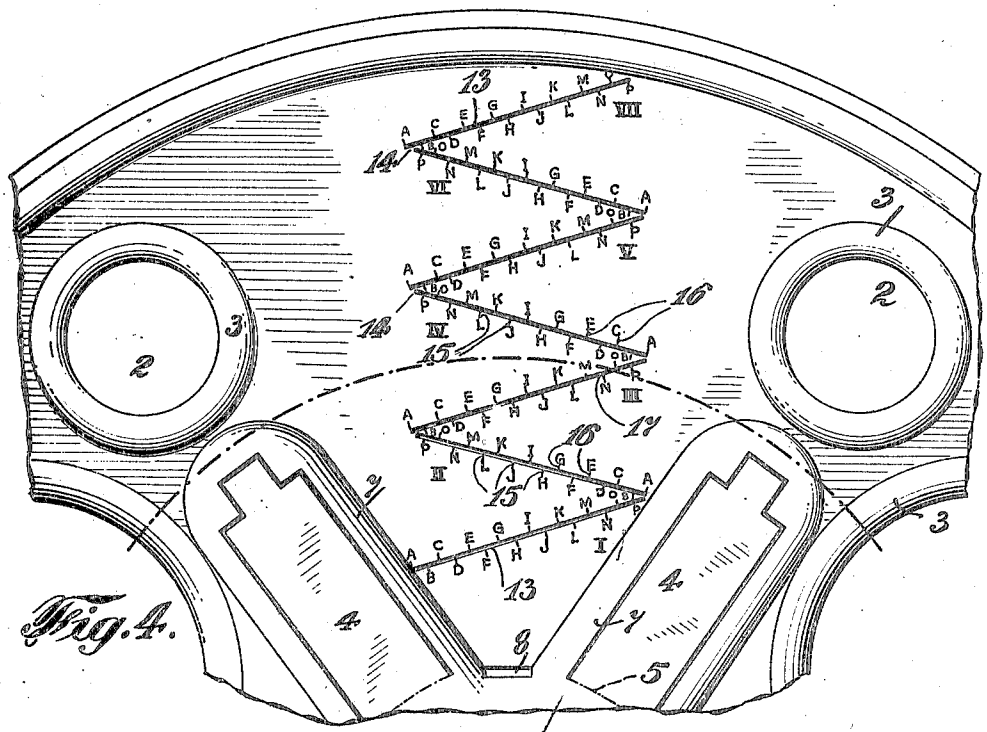



Fig. 4.

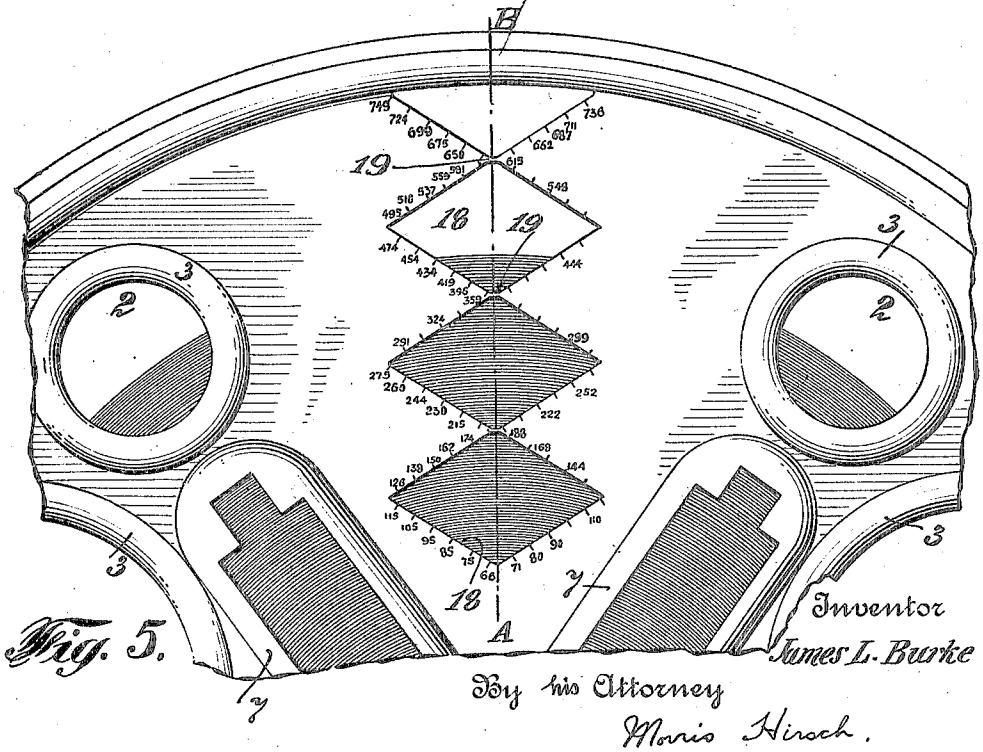



Fig. 5.

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# UNITED STATES PATENT OFFICE.

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## REEL CONSTRUCTION AND LENGTH-MEASURING MEANS.

Application filed March 2, 1921. Serial No. 449,120.

My present invention relates primarily to the measurement of the length of moving picture films, although it is not limited thereto in its application.

As conducive to a clear understanding of the invention, it is noted that moving picture films frequently become torn or ruptured in the course of winding and rewinding and may ignite at localized areas in passing the shutter of the projection machine. The operator in such cases cuts out the spoiled sections of the film, and cements the adjacent ends together. If the film is carelessly handled, necessitating the excision of substantial lengths of the film, the action may become discontinuous or jerky and the value of the film greatly impaired, if not destroyed. Accordingly, it is customary for the distributor of the film to check its length upon return from a subscribing theatre, any loss in excess of about 20 feet being regarded as detrimental, any lesser loss as negligible. Where elaborate measuring machines are used for this purpose, not only is time consumed in the measuring operation, but the reel is subjected to wear in the process of feeding it through the machine, the machine itself involving a substantial cost for initial installation and upkeep.

An object of the invention is to provide a reel by the use of which the length of film or tape wound thereon may be quickly determined to the degree of accuracy required without the use of measuring mechanism and without wear upon the film.

Another object is to achieve this result without substantial modification and without adding substantially to the cost of reels in common use.

A feature of the invention is the construction and arrangement of the reel such as to readily afford an indication on the outside thereof corresponding to the length of tape wound upon the reel.

According to a preferred embodiment of this feature, the reel itself is provided with a scale associated therewith, there being indications on the scale from which the length of the film may be read within the limits of accuracy required for the above purpose by the position of the outer convolution of the film.

Another object is to provide an inexpensive but durable reel construction.

The latter object is carried out by providing a pair of identical disks with radially extending tongues, bent at right angles to the plane of the disks, interfitting the tongues in the two disks and securing the ends of the tongues of each disk to the opposite disk, the tongues thus forming the hub construction.

In the accompanying drawings in which are shown one or more embodiments of the several features of the invention,

Fig. 1 is a plan view of one of the disks of which the reel is preferably constructed, showing one embodiment of scale,

Fig. 2 is a sectional view through the hub of a preferred form of reel,

Fig. 3 is a sectional view taken along the line 3—3 of Fig. 2,

Fig. 4 is a fragmentary view of a reel disk on an enlarged scale showing a preferred arrangement of scale divisions,

Fig. 5 is a view similar to Fig. 4 of a modification, and,

Fig. 6 is a fragmentary view of a table to be used in connection with the embodiment shown in Fig. 4.

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

Referring now to the drawing, I have shown in Fig. 1 a disk member for a reel which is to be made of the usual dimensions and which is equipped with a plurality of alternately large openings 1 and small openings 2, for the purpose of reducing weight and for showing at a glance whether or not film is on the reel. The metal is embossed as at 3 about the periphery of the openings to add stiffness to the construction. In the embodiment shown in Fig. 1 five tongues 4 are cut out from the metal of the disk, the roots 5 of these tongues lying upon a circle concentric with the disk and of a diameter equal to that of the hub construction. The longitudinal edges of each tongue are parallel as shown and each tongue has a reduced substantially rectangular extension 6. The metal about the periphery of the tongues is embossed as at 7 to add stiffness to the construction. Preferably the

tongues are of a width slightly less than the distance between adjacent tongues at their roots. Upon the periphery of the hub circle and midway between the sides of adjacent tongues, are formed slits 8 substantially equal in width to that of the reduced extension 6. The reel is made up of two of the disks described, the tongues 4 being bent, outwardly at right angles to the plane of the disks as shown in Fig. 2. The two disks are placed in parallel relation with the free ends of the tongue of each facing the companion disk and interfitting the tongues of the latter, so that the tongues on each disk fit in the spaces between the tongues of the other disk. The extensions 6 of the tongues of each disk pass through the slits 8 in the opposite disk. The tongue extensions 6 are thereupon bent over upon the outside of the disks as at 9 in Fig. 2 and the reel construction is completed, solder being used for added security, if desired. As will be apparent from Figs. 2 and 3, the tongues will make up a substantially continuous hub construction upon which the tape or reel may be wound. It will be seen that since the width of the tongues is slightly less than the distance between the roots of the tongues, a small space 10 will be left between the adjoining edges of the tongues in the completed hub construction. The inner end of the film may be passed into this space 10 and as the film is wound about the reel, the successive convolutions will frictionally hold the inner end in place.

It will, of course, be apparent that a greater or lesser number of tongues than disclosed may be employed on each disk, although I have found that most satisfactory results are achieved by the specific construction of five tongues shown and described.

As an alternative securing means for the inner end of the reel a tongue 11 may be struck up from one of the tongues 4 extending longitudinally thereof and for substantially the length thereof as shown, the tongue being curved preferably at 12 near its tip to frictionally hold the inner end of the film in a manner which will be obvious from Fig. 3.

By my reel construction, it will be seen that the expense of manufacture is low, since the need for a separate hub unit apart from the disks is entirely dispensed with. Moreover, my construction is economical in material, since the struck-up tongues which if removed would reduce the weight of the disk are utilized to form the hub construction.

*The length measuring means.*

In the preferred construction, (Fig. 4) narrow slits 13 extend diagonally across the sector, that is, in both a peripheral and a radial direction. The outer end of each slit is at a radial distance, ½ inch further from the center than the inner end of the slit, and the inner end of each slit is at substantially the same distance from the center as the outer end of an adjacent slit. In this construction the slits will be seen to extend across the reel sector in the form of a zigzag as shown, the adjacent ends of successive slits being separated by bridges 14 to avoid the liklihood of coiling up outwardly or inwardly of any free tongue formed if the zigzag were made continuous. Each slit is sub-divided preferably into eights by graduations 15 at one edge, there being graduations 16 at the opposite edge of the slit bisecting the first group of graduations, so that the slit will be sub-divided into sixteenths. Preferably the letters of the alphabet will be placed successively opposite successive graduations on each slit, as shown, the successive slits 13 being identified by corresponding numerals, in the particular case shown from I to VII. Thus I have provided the scale formed of a plurality of slits, each slit constituting a segment of the scale.

A table, a fragment of which is shown in Fig. 6 will be used in connection with the scale, the equivalent nearest number of feet corresponding to each letter on each slit being indicated.

In the specific table shown, the size of the hub has been taken as 1.75 inches in diameter and the film has been assumed to be 1/125 of an inch in thickness. To determine the number of feet of film on the reel the point of intersection of the outermost convolution of the reel with the adjacent slit is noted and by reference to the table of Fig. 6, the number of feet of film will be read opposite the corresponding letter in the group corresponding to the slit intersected. If, as will ordinarily be the case, the outer convolution of the film is located between graduations on the slit, the correct length will be determined by interpolation. For instance, assume that the outer convolution of the film intersects the slit III as at 17 half-way between divisions N and O thereon. Referring to the table and interpolating between 297 feet and 304 feet corresponding to the two letters respectively, it will be seen that the number of feet on the reel is 300 feet.

Of course, if the thickness of the film wound on the reel differs from 1/125 of an inch as assumed, a correspondingly different table would be used.

Obviously the slits 13 could be arranged parallel to each other if desired as indicated in Fig. 1 instead of in zigzag relation, although the latter construction is preferred. The length of slit may also be varied, the slits in Fig. 1, for instance, being longer and fewer than those in Fig. 4. It will also be apparent that the degree of graduation and

the angular relation of the slits may be varied in accordance with requirements without departing from the spirit of the invention.

In Fig. 5 I have shown an alternative form of the invention, in which, instead of the zigzag slitted construction shown in Fig. 1, a series or succession of quadrilateral openings 18 are provided, each with a diagonal arranged along a radius A—B of the disk as shown, and with small bridges 19 connecting adjacent vertices. Preferably the sides of the openings at each side of radius A—B form a zigzag substantially identical with that shown in Fig. 4. The four sides of each of the openings are marked with graduations as shown. In the embodiment shown in Fig. 5 the actual length of film corresponding to each graduation is indicated in feet and no auxiliary table is, therefore, required here. By this construction, it will be apparent that the outer convolution will intersect sides of an opening 18, so that the reading at each intersection may be made independently of that at the other, thereby to furnish a check for the reading.

It will be apparent, of course, that the sides of openings 18 in the embodiment shown in Fig. 5 may be lettered, if desired, and used in combination with a table as in the other embodiment, and that a greater or lesser number of the openings may be used than are shown. It will also be apparent that in the embodiment shown in Fig. 4, the lengths in feet may be directly marked on the disk.

When the film is returned to the distributor from the theatre, it is inspected for flaws in the course of rewinding. The rewinding machine exerts a definite, substantially uniform tension upon the film, winding it tightly upon the reel, so that the same length of film of a given thickness will in every case wind to a roll of the same diameter.

When the film is wound upon a reel of my invention, it will thus follow that its length will be readily and accurately determined by mere inspection and it can be ascertained almost at a glance whether an excessive number of feet of film has been lost. The expense for installation and upkeep of a measuring machine is thus eliminated, as well as the extra wear and tear upon the film and the time involved in the use of measuring machines.

The reel is preferably of substantially conventional external appearance, except, of course, for the scale measuring construction. It will be understood, however, that the gauge feature of the invention may be carried out in constructions embodying forms of keeper other than disks.

Although the invention is shown applied to moving picture reels, it will be understood that the same may be employed for the determination of the length of other rolls or tape wound on hubs or reels, and the graduations may in every case be made sufficiently fine for effecting readings of length within the range of accuracy required.

It will thus be seen that there is herein described apparatus in which the several features of this invention are embodied, and which apparatus in its action attains the various objects of the invention and is well suited to meet the requirements of practical use.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim:—

1. In a tape reel of the type comprising a hub and a coaxial disk to serve as a keeper, the disk including a scale comprising a plurality of segments extending obliquely, said disk being slitted lengthwise of said scale, whereby the outer convolution of tape wound upon the reel may readily be seen through the slitted portion in registry with a definite point of the scale, and indications adjacent said scale from which the length of tape may be readily ascertained.

2. A tape reel comprising a hub and a coaxial disk to serve as a keeper, said disk having narrow perforations arranged at different distances from the periphery of the disk and extending obliquely with respect to the contiguous radius, each group corresponding to a definite number of convolutions, and indications at intervals along the perforations, from which the length of tape may be readily ascertained.

3. A tape reel comprising a hub, a disk serving as a keeper and having a plurality of relatively large apertures to lighten the weight, a sector between a pair of said apertures having a plurality of slits therein, said slits being on lines extending outwardly toward the periphery, each slit beginning at substantially the same distance from the center of the reel as the end of the preceeding slit, whereby the outer convolution of the tape wound upon the reel may be seen through a slit in registry with a definite point thereof, from which the length of tape on the reel may be readily ascertained.

4. The combination set forth in claim 2 in which the radial component of the distance between the beginnings and ends of the slits is uniform in length.

5. In a tape reel of the type comprising a hub, a disk serving as a keeper having a plurality of relatively large apertures to

lighten the weight, the sector between two of said apertures having a plurality of slits therein, said slits being on lines extending obliquely outwardly toward the periphery, alternate slits being oblique in an opposite direction from the intermediate slits to form substantially a zigzag, slitted configuration upon the reel, an integral bridge of metal being left to join adjacent ends of the slits, said sector having scale marks along said slits, there being indications at said scale marks from which the length of tape may be readily ascertained.

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