Aug. 7, 1923. 1,463,992

G. ADAMS

FILM OPERATING MACHINE

Filed July 1, 1921 4 Sheets-Sheet 1

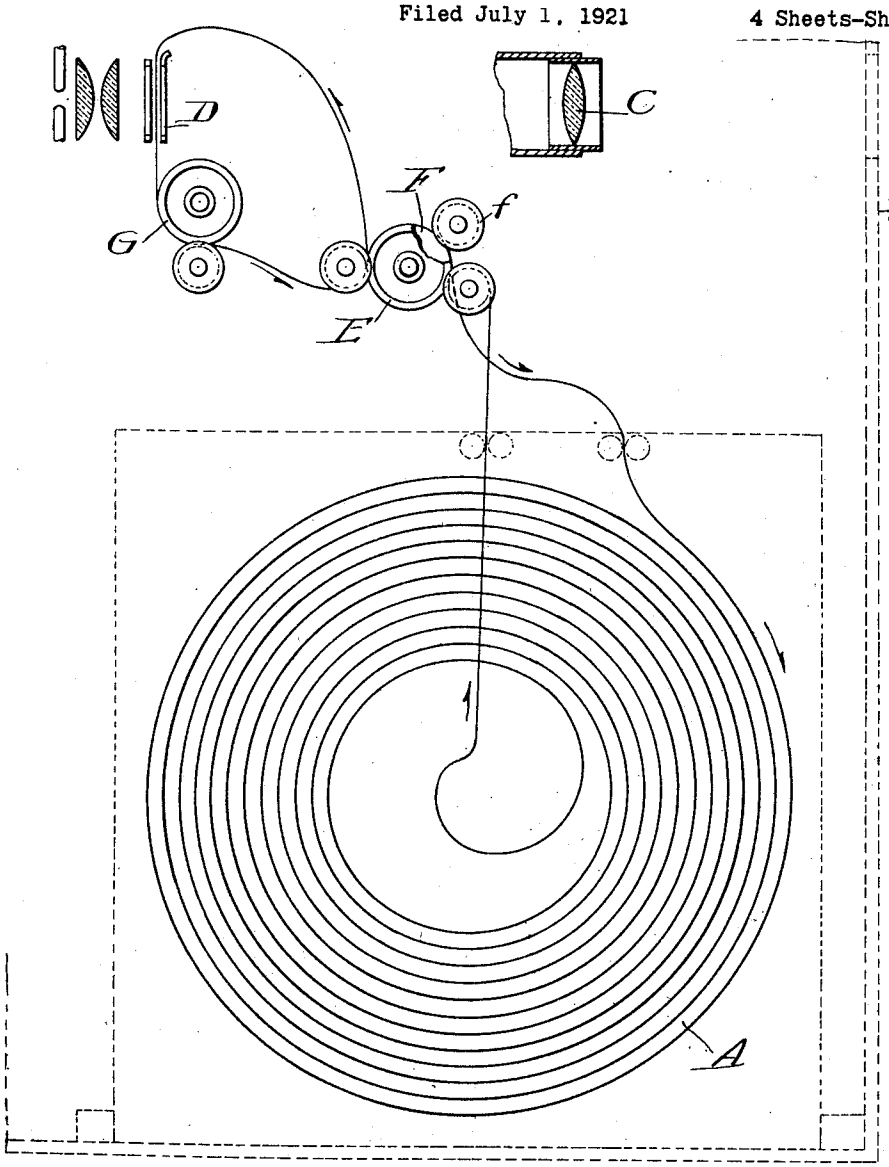


Fig. 1.

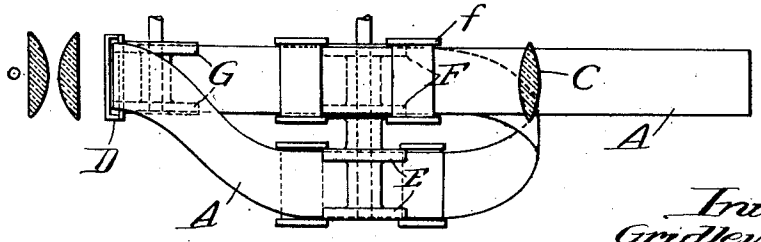


Fig. 2.

Witness:

Inventor:
Gridley Adams,
By Burton & Burton
his Attys.

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FILM OPERATING MACHINE

Filed July 1, 1921 4 Sheets-Sheet 2

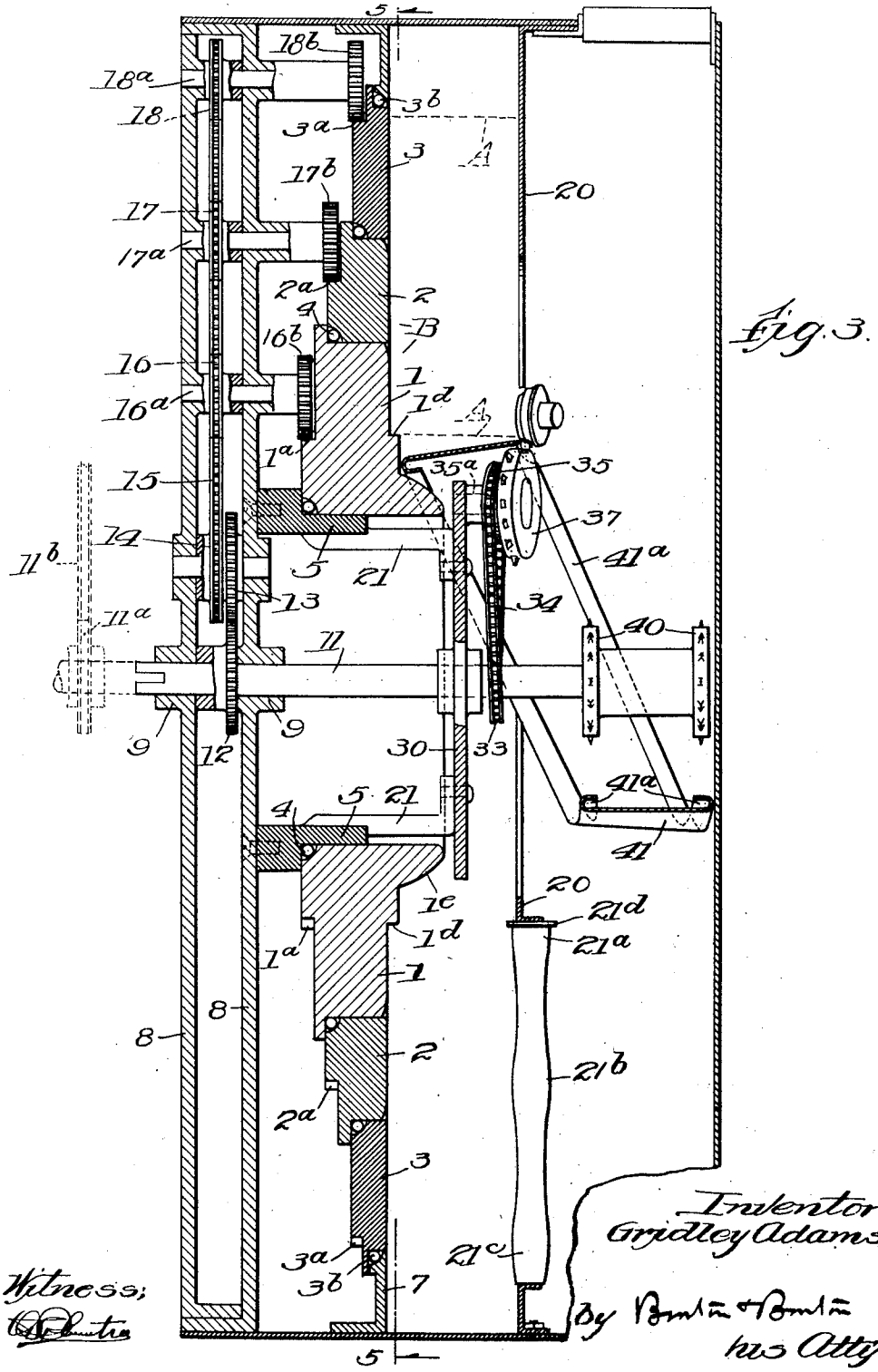


Fig. 3.

Witness;

Inventor:
Gridley Adams,
By Bowman & Bowman
his Attys.

Aug. 7, 1923. 1,463,992

G. ADAMS

FILM OPERATING MACHINE

Filed July 1, 1921 4 Sheets-Sheet 3

Fig. 4.

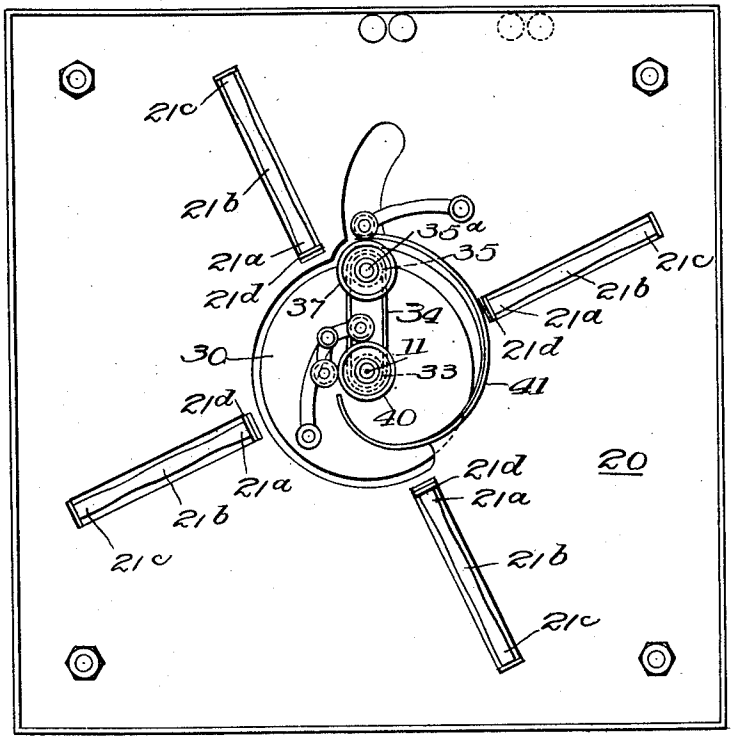
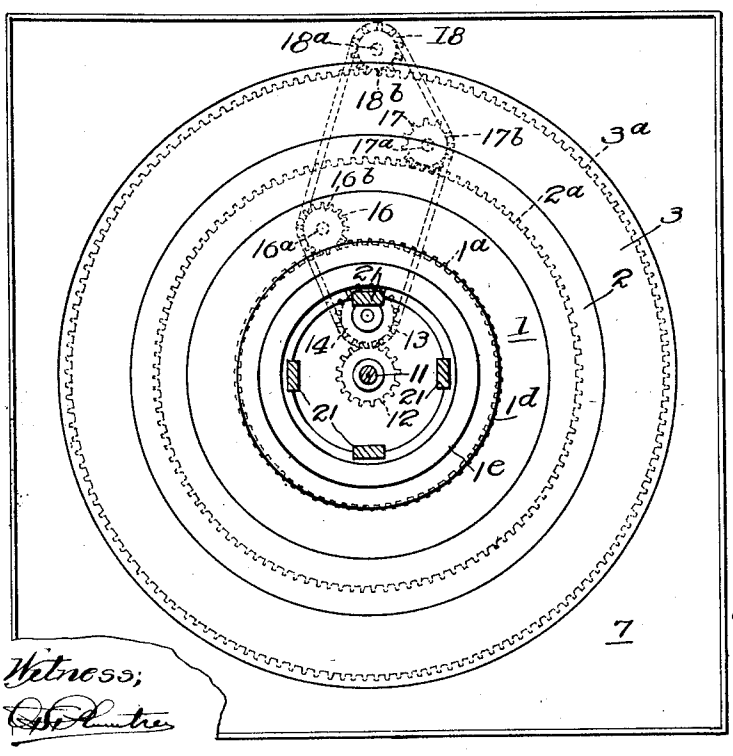


Fig. 5.



Witness;

Fig. 8.

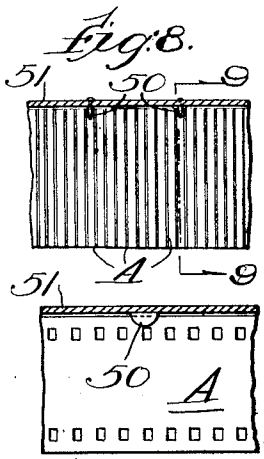


Fig. 9.

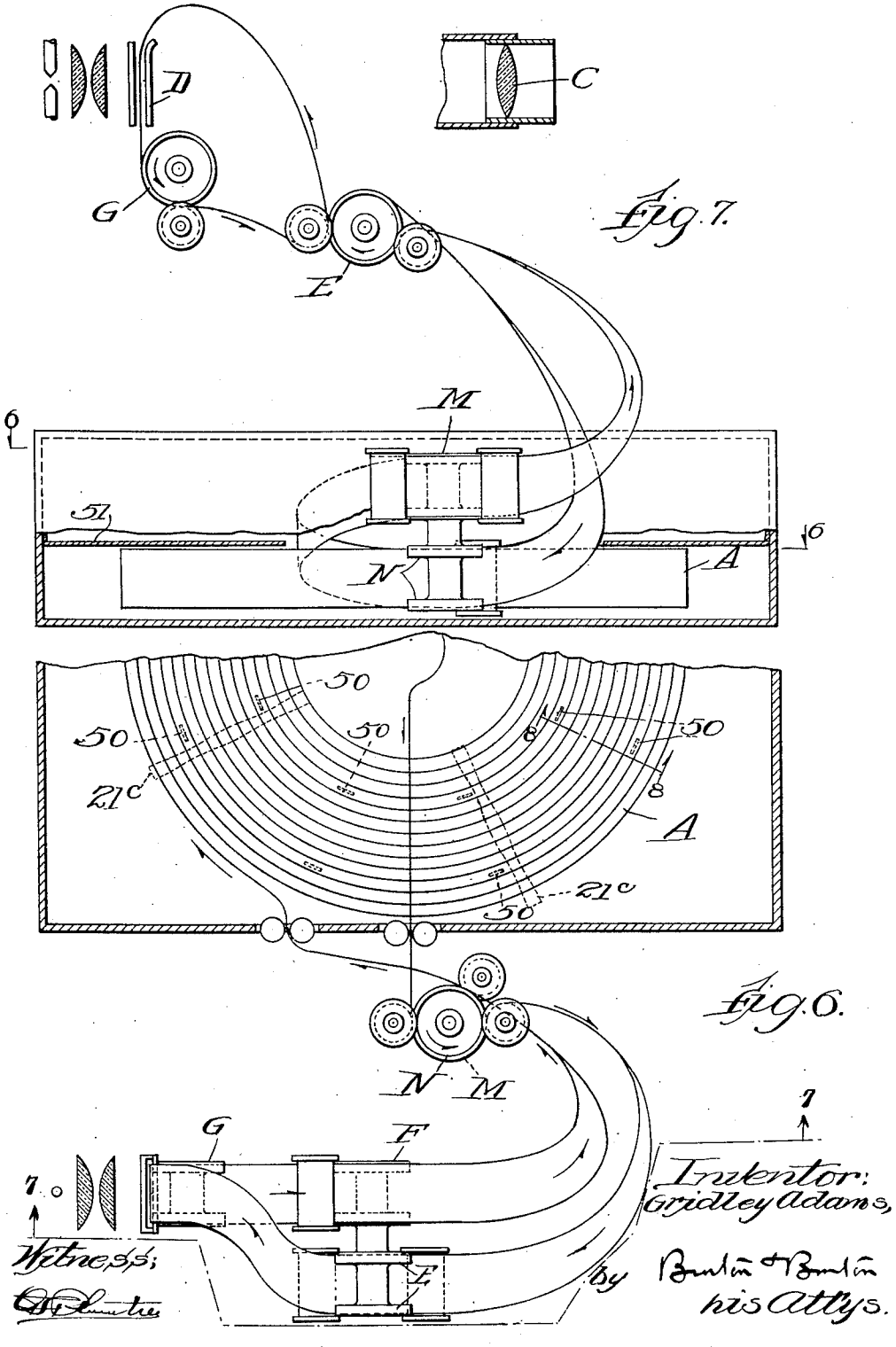
Inventor;
Gridley Adams,
by Burton & Burton
his Attys.

Aug. 7, 1923. 1,463,992

G. ADAMS

FILM OPERATING MACHINE

Filed July 1, 1921 4 Sheets-Sheet 4



Patented Aug. 7, 1923. 1,463,992

UNITED STATES PATENT OFFICE.

GRIDLEY ADAMS, OF CHICAGO, ILLINOIS.

FILM-OPERATING MACHINE.

Application filed July 1, 1921. Serial No. 481,779.

To all whom it may concern:

Be it known that I, GRIDLEY ADAMS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Film-Operating Machines, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

The purpose of this invention is to provide an improved construction of reel and associated parts for engaging the film in a moving picture display machine, the reel being adapted to handle an endless film. It consists in the elements and features of construction shown and described as indicated in the claims.

In the drawings:

Figure 1 is a diagrammatic view showing the reel and film in relation to the lens and the means for feeding the film past the lens.

Figure 2 is a plan view of the parts diagrammatically shown in Figure 1.

Figure 3 is a vertical axial section of a reel and frame structure supporting the same.

Figure 4 is a side elevation of the construction shown in Figure 3.

Figure 5 is a section at the line, 5—5, on Figure 3.

Figure 6 is a sectional top plan view of a modified construction showing the reel horizontal, section being made at the line, 6—6, on Figure 7.

Figure 7 is a partly diagrammatic view of the nature of a sectional inner side elevation of the form shown in Fig. 6, the reel casing being cut in vertical plane and partly broken away to disclose the film reel within and in section also at the line, 7—7, on Fig. 6.

Figure 8 is a section at the line, 8—8, on Figure 6.

Figure 9 is a section at the line, 9—9, on Figure 8.

In the structure shown in the drawings, A is the film. B is the reel. C is the lens. D is the film guide and exposure gate. E, E, are the film supply sprockets. F, F, are the film-return sprockets. G, G, are the film take-off sprockets. All these parts pertaining to the picture displaying machine are suitably supported in proper relative position by any proper frame structure, which frame structure is not shown in detail except as to the reel-supporting frame. This reel-supporting frame comprises two standards, 8, 8, framed together and having journal bearings at 9 for the shaft, 11, on which there is a sprocket, 11^a, for actuating a chain, 11^b, for driving at identical tangent speeds the sprockets, F, F, and G, G, above mentioned, the driving connection being any usual train employed for such purpose and therefore not herein shown. On the shaft, 11, there is also a gear, 12, which drives the gear, 13, journaled in the standard, 8, and having integral with it a sprocket wheel, 14, which by means of a drive chain, 15, drives the sprocket wheels, 16, 17 and 18, on shafts, 16^a, 17^a and 18^a, which are journaled in the standards, 8, 8, at the same tangential speed as said sprocket, 14. On said shafts, 16^a, 17^a and 18^a, there are gears, 16^b, 17^b and 18^b, of the same pitch diameter as the sprockets, 16, 17 and 18, respectively, said gears meshing respectively with the gears, 1^a, 2^a and 3^a, of the annular members, 1, 2 and 3 of the reel. Said reel comprises this series of concentric annular members, the central member, 1, being journaled by ball-bearings, 4, on an annular flange, 5, of the frame structure, and each successive annular member outside the central one being similarly journaled of the next interior, and the outermost member, 3, has ball-bearings, 3^b, at its outer circumference as shown at 7 on the frame structure. All the annular members, 1, 2 and 3, have their faces at the opposite sides from that at which the gears are mounted, in the same plane, except that the inner member, 1, is projected at the center forming a cylindrical shoulder, 1^d, whose radius is that of the pitch line of the gear, 1^a, and that a point still nearer the center said member, 1, is still further projected, forming a curved conoidal shoulder, 1^e, for guiding the film in the lateral deflection of the innermost coil thereof, as hereinafter explained. The edges of shoulders of members, 1 and 2, are slightly chamfered to prevent snagging the film.

The frame comprises beside the standards, 8, 8, an outer standard plate 20, whose inner surface is spaced away from the plane of the coincident faces of the reel members, 1, 2 and 3, by a distance approximately equal to the width of the film which is to be wound in the reel. In apertures formed in this plate there are mounted on lugs struck up

from the apertures four radial rollers comprising each three swells, 21^a, 21^b and 21^c, which are positioned opposite respectively to the annular members, 1, 2 and 3. These swells render the rollers crowning, enlarged in diameter,—opposite the pitch circles of the gears, 1^a, 2^a and 3^a, respectively; that is to say, opposite the circles or areas of said rear members respectively, at which said members have film speed. In the case of the reel member, 1, this circle is that of the shoulder, 1^d, and the rollers, 21^a, of the series opposite this member have each a flange, 21^d, at the inner end, aligned paraxially of the reel with the shoulder, 1^d, for checking or supporting the film coil at the outer edge thereof.

The reel frame comprises a plate, 30, carried by bracket arms, 21, from the annular flange, 5, about which the innermost member, 1, of the reel is journaled, said plate, 30, affording a journal bearing for the shaft, 11, at a plane about midway in the width of the film as wound in the reel. At the right or outside of the plate, the shaft, 11, has a sprocket, 33, which, by means of a chain, 34, suitably adapted for limited twisting, drives the sprocket, 35, and shaft, 35^a, which shaft is provided with journal bearing on the plate, 30. This journal bearing and the shaft therein is extended of sufficient length to the right of the plate, 30, to permit the shaft to carry at its outer end the film-actuating sprocket, 37. This last mentioned sprocket is positioned for engaging the film as it is deflected spirally out of the roll in the reel; and there is provided for guiding it in this spiral path a flanged guide, 41, under or within which the sprocket, 37, for that purpose projecting just inside of the outer or right-hand in-turned flange, 41^a, of said spiral guide. In order that this sprocket, 37, may suitably engage the sprocket apertures of the film when the latter is following the spiral course of the guide, said sprocket is mounted so that it maintains a position oblique to the shaft, 11, when it rotates in engagement with the oblique descending film.

On the shaft, 11, at a distance offset to the zone occupied by the film on the reel, are sprockets, 40, 40, over which the film passes and by which it is engaged and propelled at predetermined film speed, the pitch diameter of said sprockets being the same as the pitch diameter of the gear, 12.

From the construction described above, it will be understood that the film is fed or drawn from the inside, the innermost coil of the film being deflected in the course of the spiral guide, 41, out of the zone of the coil as the latter lies in the reel, the film then passing over the sprockets, E, E, G, G, through the guide and exposure plate, D, over the return sprockets, F, F, and the guide rolls, *f*, *f*, to the outer coil lying in the reel. It will be further understood that the purpose of subdividing the reel into three members, 1, 2 and 3, each having film speed at a certain point in its width, and providing the rollers of the series, 21^a, 21^b and 21^c, bearing against the film opposite these film speed points of the gear member, is to advance the reel as it lies in the coil uniformly at film speed at a sufficient number of points in the radius of the coil to prevent the coil from being tightened upon itself in the process of winding or by the weight of the successive coils lodging upon each other.

To a certain extent any embarrassment liable to be caused by the reel coils lagging or hanging or drawing upon each other in the process of reeling, and tending thereby to become massed at parts of the coil, may be obviated by positioning the reel horizontally instead of vertically. Such construction is shown in Figures 6 and 7. This requires no change except introducing suitable guide rollers, M and N, at different points for deflecting the films from the horizontal courses of the rotation of the coil in the reel to the vertical course for passing through the guide and exposure plate, D. The adaptation of these rollers and their position necessary for accomplishing this purpose will be obvious from the drawings without further explanation.

However, as a further means of preventing any undue friction between the adjacent coils of the film, guide lugs, 50, may be provided to project between the adjacent coils at intervals as indicated at Figure 6; as shown in Figures 8 and 9, these lugs, 50, may be supported upon an overlying wall or web, 51, adjacent the edge of the film, A, and will merely project far enough to engage the marginal portions of the film. They will be arranged, of course, spirally so as to conform with the natural coiling of the film in the storage chamber.

I claim:

1. An endless film propelling mechanism comprising a reel on which the film may be coiled slackly with clearance at the center adequate for displacing the innermost coil of the film laterally along the axis; means for engaging the film for propelling it past the lens at predetermined speed; means engaging the film at the margin of the innermost coil for deflecting it along the axis at the propelling speed of the first mentioned propelling means; the reel comprising a disk towards which the film coils are presented edgewise of the latter, and which consists of concentric annuli and means for driving said annuli each at film speed at a selected point in their width, and means for pressing the film coil against said annuli at said selected points.

2. In the construction defined in claim 1 foregoing, a laterally flanged spiral guideway for the inner coil to be deflected, for deflecting it into engagement with the last mentioned propelling means.

3. In the construction defined in claim 1 foregoing, the reel having a cylindrical shoulder on which the edge of the innermost coil of the film at the side opposite that toward which the coil is displaced lodges, and means for checking the coil laterally to maintain it thus lodged back of the laterally displaced part.

4. In the construction defined in claim 1 foregoing, the reel having a shoulder on which the edge of the innermost coil of the film at the side opposite that toward which said coil is displaced lodges, and a guide for the displaced part of innermost coil for deflecting it spirally into engagement with the last mentioned propelling means.

5. In the construction defined in claim 1 foregoing the means for pressing the film coil against the annuli at said selected points being rollers positioned radially with respect to the reel opposite said annuli respectively, said rollers being crowning with the points of greatest diameter opposite the said selected points in the width of the opposed annuli respectively.

6. In the construction defined in claim 1 foregoing the means for pressing the film coil against the annuli at said selected points being rollers positioned radially with respect to the coils opposite each annulus the face of the annuli and the axial contour of the rollers being such that the roller and the face of the annulus are nearer to each other at said selected point in the width of the annulus than elsewhere in said width.

7. In the construction defined in claim 1 foregoing, means for frictionally engaging the several annuli at said selected points with the respectively adjacent coils of the film.

8. In the construction defined in claim 1 foregoing the reel structure comprising a fixed frame and a reel shaft journaled therein; a series of equal sprocket wheels mounted in said frame all in the same plane of rotation and at different radial distances from the shaft axis; a drive chain encompassing the entire series of sprocket wheels; a gear rigid with the innermost sprocket wheel, and an equal gear on the reel shaft meshing therewith; equal gears rigid with the remainder of the sprocket wheels beyond the innermost meshing with the concentric annuli respectively, said annuli being gear-toothed on the rear side for such engagement.

9. In the construction defined in claim 1 foregoing, the reel structure comprising fixed frame and the reel shaft journalled therein; an annular flange concentric with the shaft rigid with the frame for journalling said innermost annulus of the disk, said innermost and each succeeding annulus being circumferentially formed for journalling the next outer annulus; the means for driving said annuli consisting of gear connections carried on the frame extending to and comprising a driving gear on the reel shaft.

In testimony whereof, I have hereunto set my hand at Chicago, Illinois, this 28th day of June, 1921.

GRIDLEY ADAMS.