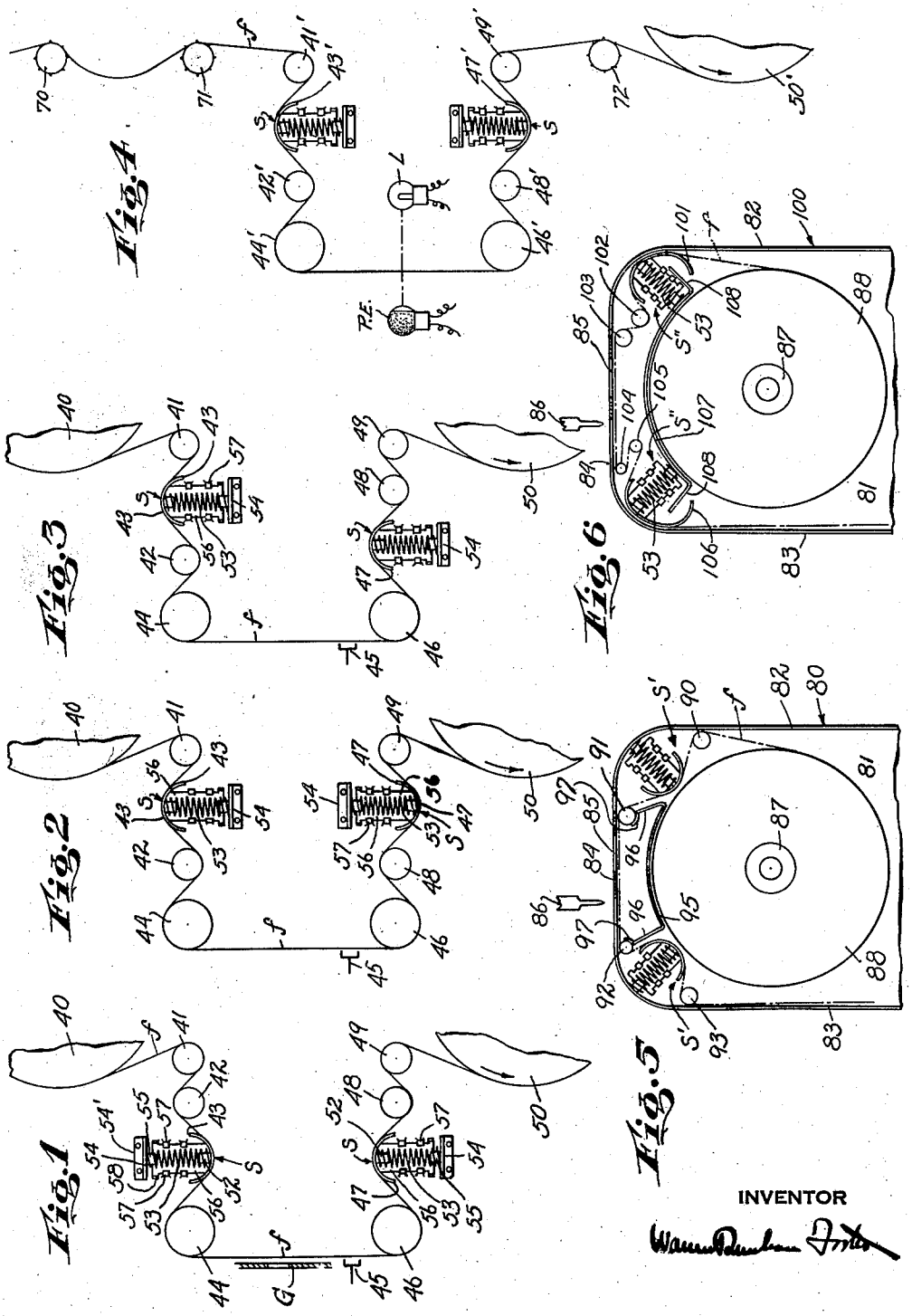
June 30, 1942. W. D. FOSTER 2,287,792

APPARATUS FOR CONTROLLING THE FEEDING OF FILM

Filed Oct. 8, 1934 2 Sheets-Sheet 1



June 30, 1942. W. D. FOSTER 2,287,792

APPARATUS FOR CONTROLLING THE FEEDING OF FILM

Filed Oct. 8, 1934 2 Sheets-Sheet 2

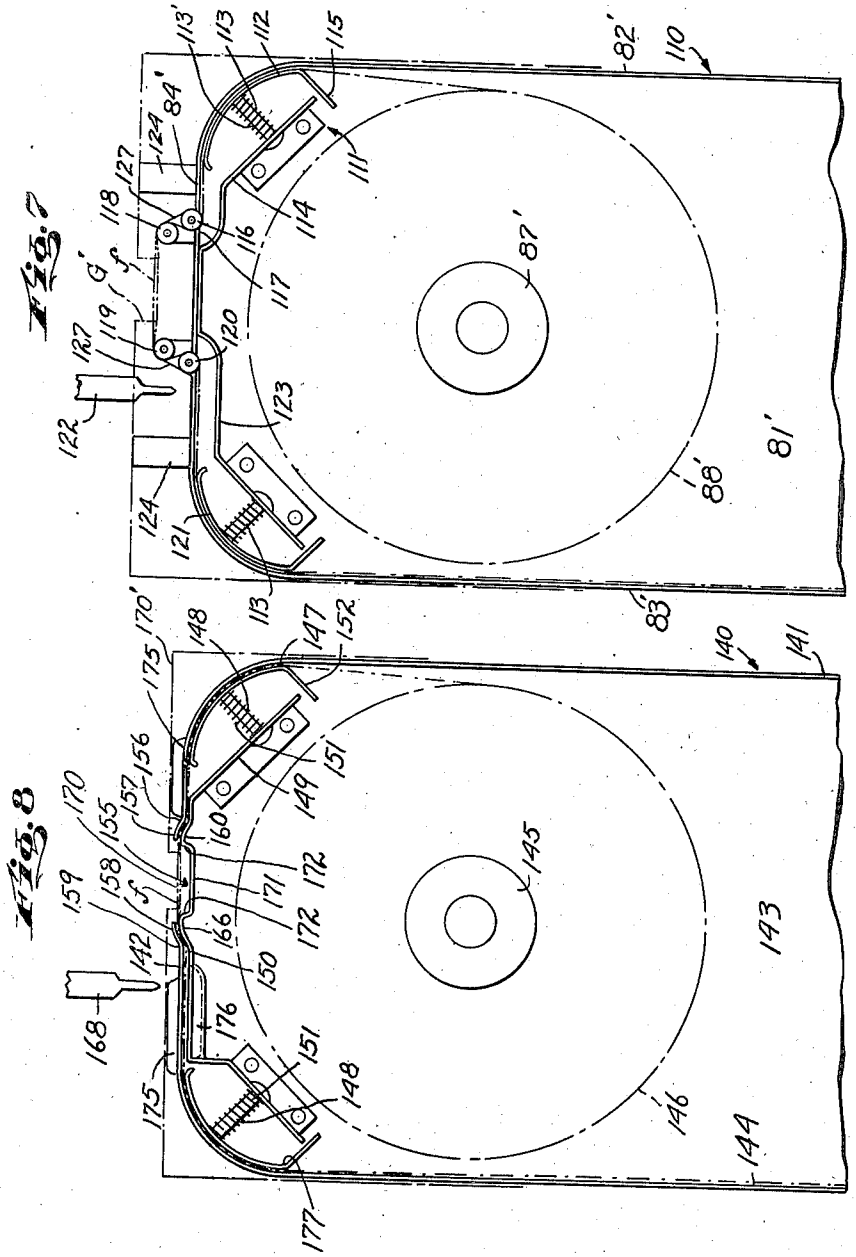


Fig. 7

Fig. 8

INVENTOR

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UNITED STATES PATENT OFFICE

2,287,792

APPARATUS FOR CONTROLLING THE FEEDING OF FILM

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Application October 8, 1934, Serial No. 747,474

23 Claims. (Cl. 88—16.2)

This invention relates generally to apparatus for the control of the feeding of film, and particularly to such apparatus which makes use of fixed retarding means, such as snubbing means, either alone or in combination with resilient film tensioning means.

In Patent Number 1,944,022 granted to Bundick and Proctor January 16, 1934, there is disclosed and broadly claimed apparatus for the feeding of film from an idling and continuously revolving delivery carrier by an intermittently operating feeding member and to a yieldingly and continuously driven take-up carrier, without the use of unsupported loops of slack film. According to the Bundick and Proctor system of film feeding both the delivery and take-up carriers are kept continuously in motion at varying rates of speed and the length of film extending between the carriers maintained under continuous tension, all by the film itself under the influence of resiliently film-operated means.

A primary object of the present invention is to improve upon the Bundick and Proctor system of feeding, particularly in making it of even wider and simpler application, particularly as applied to apparatus making use of long lengths of film.

In feeding operations which are carried out according to the Bundick and Proctor system, there are many variables. Some of these variables apply to my apparatus, either at various parts of a feeding cycle or as between successive feeding operations. An example of a variable of the first type is the changing angular relation between each film engaging member of each tensioning means and the adjacent roll of film. As the delivery coil decreases, in the apparatus shown in said Bundick and Proctor patent, the bight in which the tension member associated therewith operates increases, and a contrary condition applies to the bight associated with the take-up coil. In many other types of apparatus making use of the Bundick and Proctor system of feeding, a contrary change occurs, but in every instance, there is a change of some sort during the feeding operation. As a result, each tension control member operates under varying conditions. Another example of a variable of this type is furnished by the gradually decreasing inertia of the delivery coil as film is pulled therefrom and the gradually increasing momentum of the take-up coil as its mass builds up. The use of braking means operated by the film and applied to the two carriers tends to minimize these variations, but the Bundick and Proctor system is not dependent upon braking means and such means often are not employed.

An example of a variable of the second type is the successive use of masses of film of different weights. A user at one showing may project film which fills a large carrier and at the next he may project a "shot" or two of only a few feet in length. Another frequent cause of different operating conditions in the same apparatus arises from the use of reels which are in bad condition. Reels, particularly those for sixteen millimeter films, are often made of light and easily bent material and are occasionally poorly constructed. They are often mishandled. As a result, the tension control instrumentalities often have to cope with films which suffer from the drag, uneven movement, or side sway of a bent or otherwise damaged reel. Or the user may vary the speed of the pull down, thus subjecting the tension control apparatus to a different set of conditions. It will be understood that these variables are of much lessened importance when short lengths only of film are fed, as in amateur cameras.

The Bundick and Proctor system of feeding is very tolerant of such differing conditions and operates entirely satisfactorily in spite of them. Even better results are sometimes obtained if these variables are removed or lessened. Such is one of the objects of the present invention.

Motion picture engineers, in designing apparatus making use of the Bundick and Proctor tension control system of feeding, sometimes feel themselves hampered because of the requirements of the system, particularly in respect to the arrangements of the various film engaging parts in relation to each other. Best results are obtained by placing the film engaging member of the tension apparatus in a substantial bight of the film. Often it is not convenient to design an apparatus in which the delivery and take-up carriers are disposed in the relation to the gate or tensioning members or both thereof which is best suited to the operation of the tension apparatus. For example, such arrangement may interfere with the use of a wide-angled lens as for rear projection by demanding that the space between the two carriers be relatively small.

An important object of the present invention is to free designers of motion picture apparatus from any apparent limitations, and enable them to construct apparatus with little if any regard to such considerations.

These two objects, and others related thereto, I accomplish by providing means for so guiding

the film that the bight in which the tension apparatus engages the film is constant, or by applying retarding means of constant, or by employing both of said measures force to the movement of film so that its kinetic flow tends to be more nearly constant. I may prefer to use these means in combination or to use only one. The retarding means which I prefer are snubbing rollers, either fixed or rotatable upon a fixed axis. It will be readily understood that such means are also inherently useful as film guiding means.

Another object of this invention is to substitute such snubbing and guiding rollers for one or both sections of a conventional gate, this use being in addition to or separate from the ones which have been stated above.

An important object of this invention is to combine fixed retarding means, preferably also involving guiding means, with the invention described and claimed in my co-pending application, Serial Number 550,778, filed July 14, 1931, which upon October 9, 1934, matured as Patent Number 1,975,782, of which this application is a continuation in part. In said parent application, I describe and claim film tensioning means applied to a film-supporting magazine. An object of this invention is to combine such means in a magazine with retarding or guiding means of the type disclosed herein or both thereof. A related object is the provision of unitary gate and snubbing means combined with a film-supporting magazine which, if desired, may also have film tensioning means. A feature of this construction is that the single gate section of such a magazine carries a film forwardly of the magazine for engagement with a complementary gate section of a film handling apparatus, in the manner also described and claimed in my co-pending application, Serial Number 747,473, filed concurrently herewith and patented March 31, 1942, likewise a continuation in part of my application which upon October 9, 1934, became Patent Number 1,975,782.

Another object of the present invention is to provide resiliently mounted film tension control means arranged in combination with film guiding means in such a way that the bight of film in engagement with the film tensioning means is maintained substantially without variation regardless of the amount of film then on the adjacent carrier. Another object of the present invention is to provide such resiliently mounted film tension control means in combination with snubbing means which cooperate to help maintain a predetermined condition of tension on the film at the aperture.

Another object of the present invention is to provide film tension control means in cooperation with film guiding means to maintain the angles of the bights of the film at these film guiding means nearly constant, and to apply such film tension control means for "ripple killing" purposes in connection with mechanism for feeding a film continuously as for reproducing or recording sound.

In certain of its aspects, this invention is an improvement over the apparatus described and claimed in my co-pending, application Serial Number 706,768, filed January 15, 1934, which is a continuation in part of my application, co-pending therewith, now Patent Number 1,943,303, and upon November 12, 1940, became Patent Number 2,220,997. Said Patent Number 2,220,997 describes and claims the Bundick and Proctor system of feeding as applied to a continuously moving film. The retarding, bight-determining, and guiding means disclosed and claimed herein may be combined advantageously with the apparatus disclosed in said Patent Number 2,220,997.

A related object is to provide a magazine in which snubbing means, preferably in cooperation with film tensioning means according to the Bundick and Proctor system, also act as at least one section of a film gate.

A feature of this invention is the provision of an improved gate, said gate preferably being combined with film tensioning and film snubbing means.

In carrying out the present invention, the film guiding means between the delivery reel and the take-up reel are preferably a plurality of rolls around which the film is turned in certain relations which will appear hereinafter. Some of these rolls may be either fixed or non-revoluble rolls. Others may be rotatably mounted rollers. Or, either all fixed or all revoluble members may be used. Disposed between certain of these film guiding rolls or rollers I place my resilient film tension control means in certain desirable relations which are determined by the character of the film feeding problem to be met. The rollers may be mounted, if desired, upon a plate. This plate may be movable so as to bring the rollers into or out of relation to the film as demanded by a particular film moving operation.

Other objects, characteristics and advantages will be evident from this specification, the attached drawings, and the subjoined claims. It will of course be understood that I am showing certain preferred forms of this invention merely for purposes of illustration, and that changes may be made without departing from the spirit of my invention or the scope of my broader claims.

In the drawings:

Figures 1, 2 and 3 are diagrammatic side views illustrating different combinations of tension controlling snubbing and guiding means which may be employed in carrying out this invention.

Figure 4 is a diagrammatic side view of motion picture apparatus embodying this invention illustrated in connection with a sound reproducing device.

Figure 5 is a diagrammatic view, partly in section, of tension controlling means embodying this invention shown as mounted in a film magazine, broken away in part, and arranged to be inserted in a motion picture apparatus.

Figure 6 is a view similar to Figure 5 and shows tension guiding and snubbing means in a film magazine arranged in a different way from that in which such means are arranged in Figure 5.

Figure 7 is a diagrammatic view showing film tension, guiding and snubbing means embodying this invention mounted in a film magazine and including devices for guiding the film outside of the magazine for engagement with film feeding and exposure means.

Figure 8 shows a structure similar to that of Figure 7 but employing other snubbing means.

Figures 1, 2, and 3 show different organizations of tension control means and snubbing means by which this invention may be carried out. A delivery reel **40**, shown in part, may be rotatably mounted in any suitable way, and driven if desired according to application Serial Number 667,174, filed April 21, 1933, and co-pending herewith which upon March 4, 1941, matured as Patent Number 2,233,409, and the

film *f* may be led therefrom and passed first beneath an axially fixed roller **41**, thence over another axially fixed roller **42**, thence under a convex film guiding and snubbing member **43**, of a resilient tensioning device generally indicated by S. The member **43** may if desired be in the form of a leaf spring.

The member **43** is mounted for operation by means presently to appear, such means being similar to those described and claimed in the copending application of Frederick Davenport Sweet and myself Serial Number 567,108, filed October 5, 1931, and upon April 23, 1935, patented as Patent Number 1,998,453. It will be readily understood that the snubbing and guiding means herein described and claimed may be applied to the apparatus disclosed in said joint application. If desired, a pivoted tension controlling member of the type shown in said Bundick and Proctor Patent Number 1,944,022, may be employed in place of the assembly designated as S herein.

From the convex member **43** the film may pass over a roller **44**, thence downwardly and against an apertured gate section G, and along the work path of a usual intermittent claw member **45** to be operatively engaged and fed thereby. From the claw member, the film passes under a roller **46**, thence over a film guiding and snubbing means S which includes a convex member **47**, in the form of a leaf spring, if desired, mounted for operation by means presently to appear. From the snubbing and guiding member **47** the film passes under a roller **48**, thence over a roller **49** to a take-up reel **50**, shown in part, which may be mounted in a well known way and be continuously driven by a suitable means preferably including a usual slip clutch. A description of these driving means is not necessary for an understanding of the present invention. If desired, a second parallel gate section may be applied to the side of the film opposite to that to which the gate section G is applied.

It will be noted that Figure 2 discloses many of the several parts of Figure 3, but shows film guiding and snubbing mechanism including members **43** and **47** positioned between the guiding rollers **41** and **42** and between **48** and **49** respectively, paired snubbing rollers **42** and **44** and **46** and **48** in this figure appearing between tensioning mechanisms S and the gate and only one roller **41** and **49** respectively appearing between each of these mechanisms and reels **40** and **50** respectively, for reasons later to appear.

In the structure of Figure 3, which includes almost all of the several parts of Figures 1 and 2 but differently arranged, it will be noted that the film guiding and snubbing mechanism including member **43**, adjacent the delivery reel, is mounted between the rollers **41** and **42**. It will also be noted that the film guiding and snubbing member **47**, adjacent the take-up reel **50**, is mounted to one side of the rollers **48** and **49** and adjacent the guide roller **46**, a film, therefore, being subjected to greatest snubbing influence between the delivery tensioning mechanism and the gate and between the take-up tensioning mechanism and the take-up reel respectively. Reasons for this asymmetrical arrangement will later be apparent.

The means for yieldingly mounting the members **43** and **47** and the other parts which make up tensioning and snubbing mechanisms S will now be described. Since the same means may be used for mounting the film guiding and snubbing member **43** as is used for the member **47**, only one such means will be described. A stub pin **52** is fixed to the inner or concave side of the film contacting and snubbing member **43** and is inserted in a coil of a compression spring **53**. The upper end of this pin abuts against a lug or bracket **54** which may be mounted in any suitable way on a frame (not shown), by an integral flange portion **54'** secured by rivets or screws. A stub guiding pin **55** may be fastened to the lug **54** and be inserted in the adjacent end of the coil of the spring **53**. A guide plate or plunger **56** is fastened to the resiliently mounted member **43** on the concave side and extends upwardly, as viewed in the figures, to be engaged on each side by guide lugs or fingers **57**, two of such lugs being provided on each side of the guide member **56**. The upper end of the plate **56** may have integral ears **58** arranged for engaging the fixed guide lugs **57** and thus limiting the movement of the member **43** under action of the spring **53**.

It can be readily seen that the member **47** is mounted by the same means as described above for the snubbing means **43** and therefore such means are given the same reference numbers in Figures 1, 2 and 3. Also for clarity and in order not to confuse the drawings reference characters have been omitted as applying to certain parts of the take-up tensioning assembly of Figure 1 and also to parts of Figures 2 and 3 which are the same or closely similar to those of Figure 1.

Figure 4 illustrates one form of this invention as applied for purposes of illustration to an apparatus for projecting motion pictures and reproducing sound from a film. A continuously revolving take-up sprocket **70** advances the film *f* which has been intermittently fed past a picture exposure aperture (not shown). For the purpose of this invention, the intermittent feeding of the film past the aperture may be done by means such as shown in Figure 1, or by the means shown in the above noted patent to Bundick and Proctor, Number 1,944,022, or by suitable well known means which employs loops of unsupported slack.

Also, I have found that I may combine the Bundick and Proctor system of feeding at the picture aperture with a continuous movement of the film at the sound aperture, all without the use of unsupported loops of slack film or continuously driven toothed sprockets but with smooth rollers and snubbing means.

As is usual in the operation of film handling apparatus for moving a film past a sound head for reproducing sound from a film, a continuously revolving take-up sprocket **71** is positioned below the sprockets **70** and a loop of slack is arranged between these sprockets, which are revolved at exactly the same number of revolutions per minute by conventional means not shown. The guide roller **41'**, which corresponds to the guide or snubbing roller **41**, may be spaced a suitable distance from the sprocket **71** so that the film passes under the roller **41'**, thence over a snubbing and tensioning assembly S including a convex resilient member **43'**, and thence under a guide roller **42'** on the opposite side of the member **43'** from the roller **41'**. Two rollers **44'** and **46'** are positioned for defining the path of the film across a path of light passing from a lamp L to a photo-electric cell P. E. If desired, a sound gate may be employed, but it has been found that under some conditions such a gate

is not necessary. An optical slit, not shown, may be employed. The film after leaving the roller 42' passes over the roller 44', thence under the roller 46', thence over a roller 48', thence under a resilient tensioning member 47' which forms portions of take-up snubbing and tensioning unit S, and thence over a roller 49'.

After the film passes over the roller 49', it may be engaged by a continuously revolving hold-back sprocket 72 which operates at the same speed as the sprocket 71. It will be noted that the sprocket 72 moves the film past the photo-electric cell P. E. in cooperation with the above mentioned guide rollers and film tensioning and snubbing means in a way to provide a more uniform movement of the film, as is explained more fully hereinafter. From the sprocket 72 the film passes to a take-up reel 50', which may be driven through a slip clutch of well known construction by means not shown.

As previously stated, the rollers 41, 42, 44, 46, 48, 49, 41', 42', 44', 46', 48', and 49' may either be fixed against rotation or may be rotatable about a fixed axis, or some may be of one type and others of another, depending upon how great a retarding or snubbing action is desired. Moreover, it will be understood that the film engaging surfaces 43 and 47 of the resilient tensioning devices S will have a snubbing effect as the film slides over them, as well as 43' and 47' of S'.

The operation of the tensioning device of Figures 1, 2 and 3 is as follows: As power is applied to the feeding member 45, it moves in a feeding direction and film is pulled from the carrier 40. The plunger 56 is depressed (that is, moved against its spring and toward its fixed support) and energy is thereby stored in the spring 53. While the feeding member 45 is at rest, the spring 53 moves the plunger 56 downwardly, as viewed in the figures, whereby an amount of film is pulled from the delivery carrier 40. Upon the next operation of the feeding member 45, the portion of the film necessary to compensate for the displacement caused thereby is the length of film previously pulled from the carrier 40 and such as at that moment is pulled directly from such carrier. The resilience of the film-engaging pad 43 serves to cushion this direct movement of film directly from the delivery carrier.

The operation of the auxiliary feeding and tensioning unit which is placed between the intermittent feeding member 45 and the take-up carrier 50 is analogous to that of the corresponding unit associated with the delivery carrier. As the feeding member 45 operates, a portion of the film equal to one frame is moved forwardly. The resiliently mounted pad 47 holds the film constantly under tension. The take up carrier 50, preferably yieldingly and continuously driven, pulls the film forwardly and coils it up. This operation moves the supporting plunger 56 against the pressure of the spring 53. Thus there is stored therein an amount of energy which is sufficient to move the film away from the feeding member and to maintain the tension upon the film *f* during the next period of rest of the feeding member 45. As the carrier 50 revolves during the period of rest of the feeding member 45, the direct pull upon the perforations of the film seated upon the teeth of the sprocket is largely absorbed by the cushioning effect of the assembly S.

I have described this device as associated with an intermittently driven feeding member. As will be readily understood by those skilled in the art, my invention may be advantageously applied to a continuously driven feeding member for the purpose of securing an even and steady flow of the material irrespective of minor variations in the rate of movement of such member, as shown in Figure 4. Moreover, the opposition of assemblies S, one to the other, tends to hold the length of film therebetween under a constant tension.

Various types of cooperation between the snubbing or retarding means and the primary tensioning means may be secured. Certain of those types are illustrated in the drawings.

In the form of the invention shown in Figure 1, the retarding or snubbing rollers 41 and 42 are operative to place the section of the film associated with the delivery carrier under a uniform retarding force. As a consequence, the rewinding movement of film from this carrier will be more uniform, and the likelihood of over running will be reduced. If desired, a fixed retarding element may be applied to the carrier 40, but ordinarily, with the snubbing means shown, this device is not necessary.

Similarly, in the form of the invention shown in Figure 1, the force applied to the film by the driven take-up carrier 50 is retarded by the rollers 48 and 49, with a consequent protection to the section of the film between these rollers and the gate.

In this form of the invention, there is a closer and more immediate cooperation between the feeding member and the tensioning means than in the forms hereof shown in Figures 2 and 3.

It will of course be understood that in all forms of this invention, the use of retarding means tends to make more even and steady the flow of the material and hence to reduce the relative amount of work which remains for the resilient tensioning means. In apparatus in which retarding means is employed, it has been noted that there is practically speaking no difference between the length of successive movements of the film engaging members 43 and 47 throughout the entire feeding operation.

The structure shown in Figure 2 differs from that shown in Figure 1 in that the snubbing or retarding means is applied between the tensioning means and the gate. Such an arrangement tends to decrease the effect of the tensioning means in their tensioning function during the feeding operation and to increase their auxiliary feeding effect during the period of rest of the intermittent member, the snubbing members 42 and 44 and 46 and 48 tending to hold the film steady in the gate. Similarly, the revolution of the take-up carrier during the period of idleness of the intermittent feeding member tends to operate the tension means associated with it to a larger extent than in the form shown in Figure 1, while during the period of operation of the intermittent the carrier has less effect.

Figure 3 shows the retarding means immediately applied to the gate on the delivery side and to the take-up carrier on the take-up side. This arrangement results in a more constant speed of the carriers 40 and 50, since the feeding influence of the delivery tensioning means upon the delivery carrier is not retarded and the feeding movement of the yieldingly driven carrier 50 is more nearly independent of what occurs between the retarding rollers 48 and 49 and the gate.

If desired, the arrangement of the delivery side of Figure 1 may be combined with the ar-

rangement of the take-up side of Figure 2. Such a combination tends to slow down the rotation of the delivery carrier, while permitting greater freedom to the taking up operation. Or any other desired combination may be made.

In all forms of the invention, it will be noted that the snubbing means tends to add to the protection of the intermittent member from the pull of the take-up carrier and to decrease and make more even the pull which is applied to the delivery carrier—two very desirable results.

The operation of the form of this invention shown in Figure 4 is analogous to that of the forms previously described. The snubbing means 42'—44' and 46'—48' tend to equalize the movement of the film across the optical axis of the exciter lamp and light source while the tension means equalize the tension upon the two sides of such axis and iron out irregularities of movement. Relatively violent or sudden effect upon the stretch of film between the rollers 44' and 46' is rendered virtually impossible by the retarding means. As in all forms of the invention, the tension means holds the film in close operative relation to the snubbing means, and the snubbing means, as by preventing too great changes in film movement, assist in the operation of the tensioning means.

Especial emphasis is laid upon the fact that I so use the snubbing members that they guide the film through the apparatus and so position the film in relation to the film engaging members of the tension means that these members engage the film in bights which do not change in angular relation except under the influence of the film engaging members themselves and that these bights are of generous size and impose no acute bends on the film. Although allowing for relatively large apparatus, making use of large carriers, the various film engaging parts are disposed in close and simple relation one to the other and the film is free from acute bends. Such arrangement is of the first order of importance.

Figures 5, 6, 7 and 8 show my invention in certain of its features as applied to a film magafiine. For such use, I find that I can advantageously employ a snubbing or retarding force to act in place of a conventional gate section and also in cooperation with film tensioning means.

In Figure 5, certain features of my invention are illustrated as applied to a film magazine generally designated as 80. This magazine includes a metallic container which has a flat bottom wall 81 and a top wall or cover (not shown) joined by right and left side or edge walls 82 and 83 respectively and end walls 84, only one of which is shown. The wall 84 is provided with a suitable exposure aperture 85 and an opening (not shown) for an intermittent claw member 86 of a film handling apparatus which it is not necessary to illustrate and describe further for an understanding of the present invention. This end wall, as will be seen from an examination of these figures, is the edge wall which is adapted to be disposed in operative relation to an exposure aperture and film moving member of a film handling apparatus.

A core 87 of a film delivery coil 88 may be mounted on the bottom wall 81 by any well known suitable means, suitably light trapped. A take-up coil (not shown) may be similarly mounted on the bottom wall 81 to be driven by suitable driving means (not shown) of the above named apparatus. A connection between the take-up coil and the driving means may be the same as is shown in my said Patent Number 2,216,909, dated October 8, 1940, application for which was filed concurrently herewith.

From the delivery coil 88 the film *f* is led over a film guiding and snubbing roller member 90 which may be rotatably mounted or fixed to the bottom wall 81. From the member 90 the film passes in operative engagement with film tensioning means S' which may be of the same construction as that shown in Figure 1 and hence is not again described. This snubbing means is compactly mounted in the magazine between the side wall 82 and the end wall 84. From the snubbing means S' the film passes over a guiding and snubbing member 91 which also may be rotatably mounted or fixed on the bottom wall 81. After leaving the member 91 the film passes along in close proximity to the face of the front wall 84 of the magazine and in close relation to the aperture 85. Perforations in the film (not shown) are brought into registration with an opening for receiving the claw member 86 so that intermittent operation of the claw member pulls the film from the coil 88. After passing the aperture 85 the film passes over a guiding and snubbing member 92 which may be of substantially the same construction as the guide members 90 and 91. From the guide 92 the film passes by and in operative engagement with resilient tensioning means S' which may be essentially of the same construction as the snubbing mechanisms S' previously described. From the last named tensioning means the film passes over a guiding and snubbing member 93 which may be of the same construction as the guide members 90 and 91. As the film leaves the member 93, it passes closely adjacent the side wall 83 and on to the take-up coil (not shown). It will be understood from inspection of Figure 5 and a reading of the description hereinabove that the guiding and snubbing members 90, 91, 92, and 93 cooperate with the tensioning means S' to control the tension in the film *f* as it is fed from the delivery coil 88 to the take-up coil (not shown). The principle of operation of the snubbing and guiding means is similar to the principle of operation previously described.

Rollers 91 and 92, it will be noted, hold the film flat against the outside wall 84 of the magazine, such holding influence being supplemented during the period during which the film is motionless for exposure by the influence of the opposed spring-tensioning assemblies S'. If desired, a back gate member can be employed on the lower side of the film, as viewed in the drawings, but under many conditions such gate member is unnecessary.

To prevent light from the outside of the container 80 passing through the aperture 85 and the opening for the claws 86 and reaching and adversely affecting the film inside the container, other than the portion at the aperture 85, the following described light trapping means are provided: A plate member 95 is mounted in the container to fit closely between the top and bottom walls thereof and to have a contour corresponding with that of a full coil of film on the delivery core 87. At each end of the member 95 extensions 96 are bent upwardly as viewed in Figure 5 and extend to within close proximity of the guide members 91 and 92. The extensions 96 may each terminate in curved portions 97 arranged with curvatures for fitting closely against the guide

members 91 and 92 which are disposed in close proximity to the inner face of the end wall 84.

Figure 6 illustrates a structure somewhat similar to that of Figure 5. A film magazine generally designated as 100 may comprise a container of the same construction as the container of Figure 5. The container of Figure 6 may include a bottom wall 81 and a top wall (not shown) and a right and left side or edge wall 82 and 83 respectively, an end wall 84, which is an extension of edge walls 82 and 83, having an aperture 85 and an opening (not shown) for cooperation with the toothed feeding member 86. A core 87 for a delivery reel 88 may be mounted on the bottom wall 81.

A film *f* may be led from the delivery coil 88 to a film tensioning means generally designated as S'' which may be of the same construction except as noted hereinafter as the tensioning means S' of Figure 5. The tensioning mechanism S'' associated with the delivery coil may include a convex film engaging member 101, preferably in the form of a leaf spring, which may be shaped as shown in Figure 6. It will be noted that the central portion of the member 101 is disposed in substantially parallel relation to the curved portion of the side wall which joins the side wall 82 and the end wall 84. After leaving the member 101 the film passes around a guiding and snubbing member 102 which may be either rotatably mounted or fixed on the bottom wall 81. The film thence passes the top of a guiding and snubbing member 103 of similar construction to the member 102 and positioned closely adjacent the inner face of the end wall 84. From the guide member 103 the film passes along the inner face of the end wall 84 in registration with the aperture 85 to be turned around a guiding and snubbing member 104 thence turned again around a guiding and snubbing member 105 to pass in engagement with a film engaging member 106, preferably in the form of a leaf spring, of a tensioning mechanism S'' associated with the take-up coil (not shown). The member 106 may be formed as shown in Figure 6 to have its central portion disposed in a corresponding and parallel relation to the curved portion of the side wall which joins the side wall 83 and end wall 84. From the guiding member 106 the film passes to a take-up coil (not shown) to be wound thereupon continuously.

If desired, the member 105 may be placed as shown in Figure 6, or it may be placed to the left and slightly downwardly, as viewed in that figure, nearer to the adjacent tensioning mechanism so that the bend in the film between the rollers 104 and 105 will be less acute.

For light trapping purposes, there may be provided in the container 100 a plate member 107 which may be curved as shown in Figure 6 to be parallel with the curve of a full delivery coil of film 88 and disposed closely adjacent it. The plate member 107 may be strongly fastened to the bottom wall 81 in any suitable way and extend closely against the top wall (not shown), and serve as a support for each of the snubbing means S''. The light trapping member 107 has an extension 108 at each end bent upwardly as viewed in Figure 6 to extend well past and in overlapping relation to the adjacent extremities of the film engaging members 101 and 106. Since the light trapping member 107 fits closely against the bottom wall 81 and the top wall (not shown) and extends in overlapping relation past the members 101 and 106 which also fit closely between the bottom wall 81 and the top wall (not shown), it can be seen that light cannot pass between the two tensioning means S'' to reach any portion of the film disposed inwardly from the members 101 and 106. Each of these members 101 and 106 is forced by the spring 53 up tightly against the adjacent portions of the side walls while the film is not being fed as when it is removed from a camera for example. Thus no passage way for light is to be found between the guide members 101 and 106 and the side wall of the container 100 while the magazine is not positioned in the camera.

The movement of the resiliently mounted members 101 and 106 away from the side walls of the container during film feeding operations takes place only after the magazine has been positioned in a camera or other apparatus for handling a light sensitive film, and consequently does not fog the film. The light trapping means herein described may be used with the magazines described and claimed in my said Patent Number 2,216,909, and application Serial Number 747,473, the application for said patent and said application having been filed concurrently herewith, or the light trapping means therein described may be used herein. Claims to light-trapping devices per se similar to those which are shown herein will be found in said application 747,473.

The principle of operation of a magazine of the type shown in Figure 6 is similar to that described for a magazine of the type shown in Figure 5. The two sets of snubbing rollers 102—103 and 104—105, however, in cooperation with the tensioning mechanisms S'' furnish a substitute for a gate section which is acceptable under many conditions.

Figure 7 illustrates another application of certain features of my invention to a film magazine. This magazine is generally designated as 110 and may include a container of the same construction except as otherwise pointed out hereinafter as the container of Figure 5. It may include a bottom wall 81', right and left side walls 82' and 83' respectively, and an end wall 84'. A core 87' for a delivery coil 88' of film may be suitably mounted on the bottom wall 81', and film from the delivery coil may be conducted past a resilient tensioning means generally designated as 111. Means 111 may include a sheet metal plate member 112, if desired in the form of a leaf spring, having a convex central portion arranged with a curvature to correspond with and substantially parallel the adjacent curved portion of the side wall which joins the side wall 82' and end wall 84'. The convex member 112 may be mounted for movement away from and toward the side wall on a headed pin 113' which extends inwardly through a hole in an end portion 104 of a supporting member 114 which will be further described hereinafter. A compression spring 113 is arranged around the pin 113' between the convex member 112 and the support 114 and normally tends to force the member 112 tightly against the adjacent curved wall portion while the film is not being fed.

A lower end portion 115, as viewed in Figure 7, of the member 112 is arranged to overlap the lower end of the support 114. The support 114 extends all the way between the bottom wall 81' and a top wall or cover (not shown), and the convex member 112 and its lower end portion 115 also extends all the way between the lower wall 81' and the top wall so that light passing through the end wall 84' cannot pass by the

lower extension 115 and reach any portion of the film below the point of overlapping of the members 115 and 114.

From the convex member 112 the film passes to a roller 116 which is partly within the magazine and partly without, being disposed in an opening 117 in the wall 84'. The film passes around the roller 116 and out of the magazine through the opening 117 in the end wall 84', thence around another roller 118, which may be rotatably mounted or fixed against rotation, on a support to be further described. From the roller 118 the film is led around a roller 119 positioned on the opposite side of a space arranged to receive a gate member G', mounted upon a film handling apparatus. Said gate member may be made in the form of a rectangular tube. Such rectangular tube or gate member will ordinarily press lightly against the film between the rollers 118 and 119 which is kept taut by the tensioning and snubbing means of the Figure 7 structure. As will be seen from Figure 7, when magazine 110 is pushed completely into its operative position, the film will be displaced from the line shown in dash and double dot to that shown in dash and single dot, which represents the face of the gate and hence the focal plane of the apparatus, and by reason of the snubbing and tensioning structures herein described will be held in such position. From the roller 119, the film is conducted under and to the right (as viewed in Figure 8) of another roller 120 and thence along the inner face of the end wall 84' to pass over a resiliently mounted tensioning member 121 which may be constructed in the same way as the member 112 described hereinabove and forming part of a unit such as the tensioning unit 111. The film is then directed to the take-up coil (not shown). The front wall 84' has an opening (not shown) for rendering the film accessible to an intermittent toothed member 112.

Rollers 116, 118, 119 and 120 may be rotatable upon a fixed axis, or they may be fixed against rotation, depending upon the amount of retarding force which is desired. The entire structure which includes these four rollers may be placed further back within the magazine, if desired, so that the rollers 118 and 119 are positioned at substantially the points at which rollers 116 and 120 are shown in Figure 7.

For light trapping purposes a plate 123 may be formed as shown in Figure 7 and mounted to fit tightly between the bottom wall 81' and the top wall or cover (not shown) and thus stop the light from coming into the container 110 through the openings in the end wall 84' left for passage of the film and entrance of the tooth 122.

To prevent the inward movement of the container 80 into a camera, for example, farther than is desirable, two stop pieces 124 may be mounted on the front of the wall 84 in any suitable way, or resilient means, not shown, extending forwardly of the casing into engagement with the oppositely disposed wall of the apparatus may be employed. The pieces 124 will permit the gate member S' to press the film inwardly a certain predetermined amount between the rollers 118 and 119 as indicated by the inner film line.

The principle of operation of the structure shown in Figure 7 is similar to the principle of operation described hereinabove. That is to say, the resiliently mounted film tensioning members 112 and 121 cooperate with snubbing means such as the rollers 116, 118, 119, and 120 which may be mounted on bracket plates 127 fastened to the front of the end wall 84'.

Figure 8 discloses a film magazine 140 which may include a housing 141 of construction similar to that of the containers of Figures 5 or 6 except that an end wall 142 of the magazine 140 may be constructed in a different manner as will appear hereinafter. A bottom wall 143 and a top wall or cover (not shown) may be joined by side walls 141 and 144. A core 145 may be mounted on the bottom wall 143 in any suitable way for carrying a delivery coil 146 of film.

A film may pass from the coil 146 around a film tensioning member 147 which may be resiliently mounted by means of a headed stub pin 148 working through a hole in an end portion 149 of a light trapping member 150 which will be further described hereinafter. A coiled spring 151 which is disposed around the pin 148 tends to urge the tensioning and snubbing member 147 upwardly and against a curved connecting wall portion between the side wall 141 and the end wall 142. The tensioning member 147 may have an extension 152 downwardly extending as viewed in Figure 8, which passes by and overlaps the downmost end of the end portion 149. This arrangement is effective to prevent any light passing into the container 141 through openings in the end wall 142 to reach any part of the film within the housing.

In accordance with that feature of my invention which resides in the provision of improved compact snubbing means for cooperation in a film magazine with resilient film tensioning means, I may construct the end wall 142 adjacent an opening 155 therein as follows: At a point 156 adjacent the opening 155 on the right hand side, as viewed in Figure 8, I bend the end wall up on an easy curve so that the bend may serve as a snubbing element and light trap as will more clearly appear hereinafter. At 157, I bend the end wall downwardly again so that its extremity adjacent the opening 155 may be substantially parallel to the main portion of the end wall. A short distance on the opposite side of the opening 155 I bend the end wall down from 158 and again at 159 I bend the end wall with an easy curve and dispose it in a plane at right angles to the planes of the side walls 141 and 144.

To cooperate with the above described elements formed by the bends 156 and 159 I may arrange the light trapping member 150 with bends at 160 and 166 to cooperate with the previously described bends. The member 150 is positioned closely adjacent the end wall 142 on each side of the opening 155 for a short distance. It can be seen by inspection of Figure 8 that the film f as it passes between the bent portions of the end wall 142 and the member 150 will have four different bends or bights where it engages against rounded corners of the end wall or of the member 150 which thus serve as snubbing elements and help to improve the uniformity of the film movement as it is fed intermittently by a toothed member 168. Moreover, the close contact at these points assists in the light trapping. When the magazine 140 is slid into a motion picture camera, for example, the end wall adjacent the aperture 155 will ordinarily be stopped by a fixed or resilient element 170' of the camera in a way to position the film extending across the aperture in correct registration with the focal plane of the camera and also in contact with an apertured gate member which is indicated in dot and dash outline at 170. It

will be noted that the gate member 170 ordinarily presses the film *f* inwardly a slight amount from its outer position, this preliminary position being as shown in Figure 8 in dot and double dash line. To facilitate this coaction with the member 170 and the film, the light trapping member 150 is formed with a recess portion 171 opposite the aperture 155 and with rounded corner portions at 172 which serve as snubbing elements in cooperation with the above named snubbing elements. In order to position the magazine in the camera so as to bring the film *f* and the gate member 170 into proper cooperative relation, portions of the end wall 142 may be struck up to form locating bosses or ribs 175 for cooperation with the element 170'.

It will be observed that accurate positioning between the magazine and the camera is unnecessary since the pressure of the gate element 170 upon the film, which is retarded and held as noted above, brings the film into the focal plane of the camera.

To provide room for the toothed member 168 to pass through the film *f* during its feeding of the same the end member 142 may have a suitable opening (not shown) and the light trapping member 150 may be formed with a valley like portion 176 so that the end of the toothed member will not scrape on metal.

After the film *f* passes beyond the above noted snubbing means of Figure 8, it is led around a film tensioning member 177 which may be constructed in the same way as the tensioning member 147 and be resiliently mounted in like manner on a similar support. From the tensioning member 177 the film is conducted to a take-up coil (not shown) which preferably will be continuously and yieldingly driven.

It can be seen by inspection of Figure 8 and the above description thereof that I have disclosed an inexpensive compact gate, snubbing, and tension-controlling means suitable for use in a film magazine. It will be further noted that I have provided compact inexpensive means for disposing the film in operative corelation to an apertured gate member so that the film is maintained against such gate member as it is advanced during a feeding operation.

It will also be noted that the spring operated members 112, 121, 147 and 177 are shaped correspondingly to the curved corners in the adjacent wall of the magazine. Thus they tend to press the film against such corners and to serve as light traps, particularly when the film is not being fed.

If desired, tensioning means such as shown in Figures 5 and 6 or in the said co-pending application now Patent Number 1,998,453 may be substituted for those described in Figures 7 and 8.

Attention is directed to my co-pending applications filed concurrently herewith, now said Patent Number 2,216,909 and Serial Number 747,473, both of which are continuations in part of my application Serial Number 550,778, filed July 14, 1931, now Patent Number 1,975,782. All three of these co-pending applications contain related subject matter, and certain of the features of one may well be combined with certain of the features of others.

From Figures 5, 6, 7 and 8, it will readily be seen that this invention provides a compact and inexpensive film magazine, itself embodying film tensioning and auxiliary feeding means and a novel substitute for one of the conventional gate sections, all constructed, preferably together with snubbing means, in a unitary manner. According to an important feature of this invention, the film, at its point of engagement with the focal plane of a film handling apparatus, is supported forwardly of the body of the magazine, or in line with the forward wall, by the above noted unitary mechanism.

In view of the fact that in accordance with this invention the film may be led through the apparatus as desired and the tension apparatus need not be placed in a particular fixed relation to the carriers and the gate, it is now possible to apply the tension control system of feeding to existing apparatus, as well as better to embody it in apparatus which is especially built to accommodate it.

Certain of the advantages of my invention will appear from the drawings, the above description, and the subjoined claims.

Other advantages reside in the provision of an inexpensive film tensioning unit which may be manufactured in quantities as a separate unit and applied to various kinds of film handling apparatus.

Other advantages reside in the organization of simple fixed rollers in combination with film tensioning means, the latter being arranged with a film engaging convex member which also serves as a snubbing means. Still other advantages arise from the compact construction of a film magazine having film tensioning means disposed in space conserving relation in the corner portions of the magazine where a coil of film does not extend.

Still other advantages reside in the provision of inexpensive light trapping means which also serve as supports for film tensioning means and the use of film tensioning means as light trapping means.

I claim:

1. In a film handling apparatus, a delivery carrier, a take-up carrier, means for feeding a film from said delivery carrier toward said take-up carrier, tension control mechanism cooperating with one of said carriers, said mechanism comprising axially fixed convex arcuate film engaging means for engaging the same side of the film at longitudinally spaced positions to provide a bight, a movable member for engaging the film in said bight throughout the entire feeding operation, and means for pressing said member against the film continuously for subjecting the film to predetermined conditions of tension during the feeding operation, and means additional to the foregoing engaging the film between said last-mentioned carrier and said bight-providing means for subjecting the film to a constant and uniform retarding force throughout the feeding operation supplemental to but independent of the control applied by said tension control mechanism.

2. In a film handling apparatus, a delivery carrier, a take-up carrier, means for feeding a film from said delivery carrier toward said take-up carrier, tension control mechanism cooperating with one of said carriers, said mechanism comprising axially fixed convex arcuate film engaging means for engaging the same side of the film at longitudinally spaced positions to provide a bight, a movable member for engaging the film in said bight throughout the entire feeding operation, means for pressing said member against the film continuously for subjecting the film to predetermined conditions of tension during the feeding operation, and means additional to the foregoing engaging the film between said feeding means and said bight providing means for subjecting the

film to a constant and uniform retarding force throughout the feeding operation supplemental to but independent of the control applied by said tension control mechanism.

3. In a film handling apparatus, a delivery carrier, a continuously driven take-up carrier, a gate therebetween, film feeding means for advancing a film from one of said carriers to the other thereof through said gate, film engaging means disposed between said carriers for establishing a work path for the film between said carriers and past said feeding means and to and from said gate and for subjecting the film to a material and constant retarding influence during the feeding operation, said means including axially fixed convex arcuate film engaging means contacting the same side of the film at longitudinally spaced points along said work path for providing a bight, film tensioning means additional to said film retarding means including a movable member for engaging the film in said bight throughout the entire feeding operation, and means for continuously pressing said movable member into operative engagement with the film during the entire feeding operation, the operation of said tensioning and retarding means supplementing each other in producing a more uniform feeding movement of the film.

4. In a film handling apparatus, means for supporting a delivery coil of film, means for supporting and continuously driving a take-up coil of film, means establishing a work path for the film between said coils, and a member engaging the film between said coils along the work path for feeding the film from one of said coils toward the other, said means establishing said work path including spaced guiding means with surfaces so disposed as to engage opposite sides of the film at adjacent and relatively fixed points in angular relation to each other whereby the line of travel of the film is displaced and also having surfaces engaging the same side of the film and so disposed in spaced alignment along the long axis of the film as to establish a bight in the film, movable tensioning means engaging the film in said bight, and means for continuously pressing said tensioning means against the film during the entire feeding operation thereby increasing the total retarding effect of said guiding surfaces which engage opposite sides of the film in angular relation during the continued advance of the film.

5. In a film handling apparatus, a delivery carrier, a continuously driven take-up carrier, means for feeding a film from said delivery carrier towards said take-up carrier, tension control mechanism cooperating with said delivery carrier, tension control mechanism cooperating with said take-up carrier, and path defining means adjacent each of said carriers for providing bights which at the limits of their enlargement and reduction, respectively, are of approximately the same angular relation to a member engaging them throughout the feeding operation, each of said tension control mechanisms including an arcuate and irrevoluble member frictionally engaging the film in each of said bights therein, spring-urged means for continuously pressing each of said irrevoluble members against the film throughout a feeding operation, and devices for guiding each of said members for to-and-fro movement along a path at right angles to the line of tangency of said arcuate member where the long axis of said path defining devices intersects the film, said control mechanism being effective for continuously subjecting the film to predetermined conditions of substantial tension.

6. In a film handling apparatus, a delivery carrier, a continuously driven take-up carrier, means for feeding a film from said delivery carrier towards said take-up carrier, tension control mechanism cooperating with one of said carriers, and path defining means adjacent said last-mentioned carrier for providing a bight which at the limits of its enlargement and reduction, respectively, is of approximately the same angular relation to a member engaging it throughout the feeding operation, said tension control mechanism including an arcuate and irrevoluble member frictionally engaging the film in said bight, spring-urged means for continuously pressing said irrevoluble member against the film throughout a feeding operation, and devices for guiding said member for to-and-fro movement along a path at right angles to the line of tangency of said arcuate member where the long axis of said path defining devices intersects the film, said control mechanism being effective for continuously subjecting the film to predetermined conditions of substantial tension.

7. In a film handling apparatus, a carrier, a first roller placed adjacent said carrier in such position that the film as it travels therebetween forms an acute angle therewith, a second roller placed adjacent said first roller and with its axis in line with the axis thereof, a third roller placed adjacent said second roller and with its axis in line with the axis thereof, the film passing over a face of said second roller opposite the face of said first roller over which it passes and a face of said third roller over which the film passes corresponding to that of said second roller over which the film passes, a movable film tensioning member engaging the film in the bight formed between said second and third rollers, means for continuously pressing said tensioning member against the film in said bight and with sufficient force to subject it to material and uniform tension, said tensioning member and said rollers cooperating continuously to subject the film to uniform tensioning and retarding influence throughout a feeding operation, and means for feeding the film between said carrier and said third roller.

8. In a film handling apparatus, a carrier, a first roller placed adjacent said carrier in such position that the film as it travels therebetween forms an acute angle therewith, a second roller placed adjacent said first roller and with its axis in line with the axis thereof, a third roller placed adjacent said second roller and with its axis in line with the axis thereof, the film passing over a face of said first roller corresponding to the face of said second roller over which it passes and a face of said third roller over which the film passes being opposite to that of said second roller over which the film passes, a movable film tensioning member engaging the film in the bight provided between said first and second rollers, means for continuously pressing said tensioning member against the film in said bight and with sufficient force to subject it to material and uniform tension, said tensioning member and said rollers cooperating continuously to subject the film to uniform tensioning and retarding influence throughout a feeding operation, and means for feeding the film between said carrier and said third roller.

9. A gate for use in a film handling apparatus, said gate comprising an apertured member and means complementary thereto for holding a film

in operative relation therewith, said holding means comprising two pairs of film engaging snubbing members, means for mounting said pairs in spaced relation to each other and in such relation to the film engaging plane of said apertured member that the portion of the film extending between said pairs engages said plane, one snubbing member of each of said pairs being disposed in a straight line relation to the corresponding snubbing member of the other pair and in such relation to said plane that the film is guided therealong, and resilient means for maintaining the film in close contact with each snubbing member of each pair thereof.

10. In a film handling apparatus having means for projecting pictures and reproducing sound from a film, continuously operating means for advancing the film after it is fed past said projecting means, a sound head, continuously operating means for moving the film advanced past said projecting means by said sound head, and unitary snubbing and resilient tensioning means for providing an increased uniformity of the film movement past said sound head, said last named means including, in combination, a plurality of guiding and snubbing rollers, said rollers being disposed on parallel axes adjacent each other and with film engaging surfaces in such angular and spaced relation to corresponding surfaces of the others thereof and to the film that they subject the film to a material and constant retarding or snubbing action, movable film tensioning means cooperating with said guiding and snubbing rollers and engaging the film adjacent thereto for controlling the extent of the contact of the film with the adjacent rollers, and means for constantly pressing said film tensioning means against the film for maintaining the film under resilient tension as well as under such retarding influence as it passes the sound head.

11. In a film handling apparatus having a sound translating element and continuously operating means for moving a film therepast, combined unitary tensioning and retarding means for providing a greater uniformity of movement of the film as it passes said translating element, said unitary means including a plurality of closely spaced rollers rotatable upon fixed axes revoluble upon fixed and parallel axes in line with each other and disposed upon one side of said sound translating element, the film being so threaded that it engages opposite faces of each adjacent roller, said rollers being so positioned that the angular relation of said film engaging faces causes the film to be subjected to a material retarding influence, and resilient means engaging the film between two of said rollers for placing the film under substantially uniform and constant tension during a feeding operation thereby supplementing said material retarding influence.

12. In a film handling apparatus having a sound translating element and continuously operating means for moving a film therepast, tensioning and retarding means for guiding a film past said translating element and providing uniformity of film movement past said sound translating element, said last named means including a plurality of closely spaced axially fixed rollers in line with each other and disposed one set upon each side of said sound translating element, those of said rollers nearest said translating element being so disposed that the film passes into operative relation with said element in a plane parallel to its principal axis, the film being so threaded that it engages opposite faces of each adjacent roller, the rollers of each of said sets being so positioned that the angular relation of said film engaging faces causes the film to be subjected to a retarding influence, and resilient means engaging the film between two of said rollers for placing the film under substantially uniform and constant tension.

13. In combination, a magazine having a substantially rectangular housing for supporting and protecting a film and a pair of spaced film engaging and guiding rollers, means for supporting said rollers upon said magazine beyond the periphery of said housing, openings adjacent each of said rollers, said rollers being so arranged between said openings and in relation to said housing that the film extends from said housing through said openings and between said rollers exteriorly of said housing, means engaging the film adjacent each of said openings for holding the film taut therebetween, and a film handling apparatus having a gate section and means for mounting said magazine upon said apparatus so that said length of film extending between said rollers of said magazine is disposed in operative relation to said gate section of said apparatus and the film is engaged thereby.

14. A film magazine for use in a film handling apparatus having film feeding means, said magazine including a container for a delivery coil and a take-up coil of film, said container having an edge wall member with a group of openings therein, means for guiding a film extending from said delivery coil through one of said openings and along said edge wall and again into another of said openings to be wound upon said take-up coil, said last named means including two guide rollers positioned on said end wall, one roller at one side of said group of openings and one roller at the other side thereof and two other guide rollers one of which is supported on said magazine outwardly from each of said first named rollers adjacent thereto, the film passing from one of said last named rollers to the other to be exposed.

15. A film magazine for use in a film handling apparatus; said apparatus having means for mounting a magazine thereupon and an apertured gate member; said magazine having flat top and bottom walls and enclosing side or edge walls joining said top and bottom walls, means for mounting a delivery coil in said magazine, film-positioning means including film-contacting members disposed upon each side of an opening adapted for the reception of a gate member of the apparatus, said opening being effective for rendering film drawn from said coil accessible to said gate member, said film-contacting members and said magazine and said mounting means being arranged to hold the film across said opening so that when said magazine is disposed in assembled relation to said apparatus said gate member thereof passes within said opening and presses the film backwardly toward the magazine into a plane between said film-contacting members and the interior of said magazine, said film-positioning means leaving the stretch of film opposite said gate member without a backing against which the film may be pressed by said gate member, and resilient tensioning means mounted inside said container on each side of and adjacent said film-positioning means and exerting substantial and continuous opposed pressure upon the film for helping to hold the film taut and flat against said gate member.

16. In combination, a film handling apparatus having means for mounting a film-containing magazine thereupon, an exposure aperture, and a member for advancing a film past said exposure aperture and a film magazine, said magazine including flat top and bottom walls and enclosing side or edge walls joining said top and bottom walls, one of said side walls having passage ways for the film to be drawn therethrough to the exterior of and back into said magazine, means for mounting a delivery coil in said container, means for rendering the film accessible to said feeding member as it is fed between the coils, and resilient film tension controlling means mounted in said magazine for engaging the film on each side of said feeding member while the film is engaged by said member for cooperating with said film feeding member, and snubbing means additional to said tensioning means mounted on said magazine for cooperation with said film tensioning means and positioned so that they engage both sides of the film at adjacent angularly displaced points for retarding its movement and also positioned for guiding the film outside of said magazine and into operative relation with said exposure aperture and again into said magazine.

17. For use in a film handling apparatus having a film feeding member, a film magazine for supporting and protecting a coil of film and having parallel top and bottom walls and enclosing side walls joining said top and bottom walls, one of said enclosing walls having means for rendering the film accessible to light, a supporting and light retarding wall within said magazine extending in the same general direction as said last mentioned enclosing wall and spaced therefrom and in cooperation with said enclosing wall and the adjacent portion of said parallel walls forming a passage way through which the film travels between said coil and said means which render the film accessible to light, and a film tensioning member mounted upon said supporting wall for resilient movement toward and away from said wall upon the side adjacent said enclosing wall at a point between a point opposite said means which render the film accessible to light and the coil of the film, means for mounting said film engaging member for movement in a line substantially normal to the adjacent portion of said enclosing wall, the film engaging surface of said tensioning member being parallel to that of the adjacent portion of said enclosing wall, whereby when the film is not being fed the film is held against said adjacent portion, said tensioning member thereupon cooperating with said passage to impede the entrance of light into the interior of said magazine.

18. For use in a film handling apparatus having a film contacting part, a magazine adapted to support a delivery and a take-up coil of film, said magazine having parallel top and bottom walls and enclosing side or edge walls extending therebetween, a portion of one of said side walls extending forwardly of the plane of the remainder of said wall and having an opening therein for the reception of the film contacting part of the apparatus, an auxiliary wall also extending between said parallel top and bottom walls and spaced rearwardly of said enclosing side wall having said opening and being so disposed that it cooperates with said side wall and said parallel walls to form passage ways for the film leading from said delivery coil to said opening and from said opening toward said take-up coil and also prevents light from passing through said opening to the interior of said magazine, said auxiliary wall being so disposed relatively to said side wall that the portion of said passage ways adjacent said aperture are relatively narrow, said passageways being formed to conduct the film past said forwardly extending wall portions, whereby the film is guided to a plane external to the body of said magazine for engagement with a film contacting part of said apparatus, the portion of said passage ways relatively adjacent the corners of said magazines being enlarged, and tensioning members mounted in said enlarged portions of said passage ways and engaging the film and adapted to hold it under tension so that it is maintained flat and taut while the film is moving across said aperture in said projecting portion of said side wall.

19. For use in a film handling apparatus, a film supporting magazine, said magazine including a walled housing within which a delivery coil and a take-up coil of film are disposed, a first film passageway leading from said delivery coil to a point outside of said housing and beyond the plane of the adjacent side wall thereof, a second film passageway leading from a point spaced from and aligned with the external mouth of said first film passageway and toward said take-up coil, both of said passageways being curved and relatively narrow so that as the film is moved therethrough the walls of said passageways engage the film to exert a snubbing influence thereupon, and resilient means engaging the film between the internal opening of each of said passageways and the adjacent one of said coils of film respectively and so disposed in relation to the length of film extending between the external mouths of said passageways that they exert opposed pressure upon the film thereby tending to maintain the length of film between the external mouths of said passageways flat and under tension.

20. A film magazine having a substantially rectangular housing for supporting and protecting a film and two spaced film engaging and guiding rollers, means for supporting said rollers upon said magazine beyond the periphery of said housing, openings for passing the film adjacent each of said rollers, said rollers being so arranged between said openings and in relation to said housing that the film extends from said housing through said openings and between said rollers exteriorly of said housing, and means engaging the film adjacent each of said openings for holding the film taut therebetween.

21. A film magazine having top and bottom walls and an enclosing side or edge wall joining said top and bottom walls, means for mounting in said magazine a delivery coil and a take-up coil of film, and means for defining a film path from said delivery coil to said take-up coil adjacent one of said side walls having an opening therein for the reception of film feeding means, said path defining means including means arranged for controlling the tension of the film as it is fed from said delivery coil to said take-up coil, said tension controlling means including film snubbing members disposed in bights of the film and at least one member resiliently mounted along said film path for cooperation with said snubbing members, said resilient member being separate from and additional to said snubbing members and having a film guiding surface formed and mounted substantially parallel to an adjacent side wall of said magazine, said resilient member defining

one wide side of the film path and said side wall defining the other.

22. A film containing magazine including flat top and bottom walls and enclosing side walls joining said top and bottom walls, one of said side walls having means through which the film may be drawn to a point exterior to said magazine, means for mounting a coil of film in said magazine, means for rendering the film accessible to a feeding member as it is moved in relation to said coil, resilient tension controlling means mounted in said container engaging the film for cooperating with said film feeding member, and snubbing means mounted in said container for cooperation with said film tensioning means and engaging both sides of the film for exerting a retarding influence thereupon, said snubbing means also including devices for guiding the film to a point outside of said container for exposure or projection and again into said container without passing against the adjacent wall portion of said magazine.

23. A film containing magazine adapted to support a delivery coil and a take-up coil of film, said magazine having parallel top and bottom walls and enclosing side walls extending therebetween, a portion of one of said side walls extending forwardly of the plane of the remainder of said side wall and having an aperture therein, an auxiliary wall extending between said parallel walls and spaced rearwardly of and parallel to said enclosing side wall having said aperture and being so disposed that it cooperates with said side wall and said parallel walls to form passage ways for the film leading from said delivery coil to said aperture and from said aperture toward said take-up coil, said auxiliary wall being so disposed relatively to said side wall that the portion of said passage ways adjacent said aperture are relatively narrow, said passage ways being formed to conduct the film past said forwardly extending wall portions whereby the film is guided to a plane external of the body of said magazine for engagement with a film contacting part of an apparatus and the portion of said passage ways relatively adjacent the corners of said magazine being enlarged, and tensioning members mounted in said enlarged portions of said passage way engaging the film and adapted to hold it under tension so that it is maintained flat and taut while the film is moving across said aperture in said projecting portion of said wall.

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