

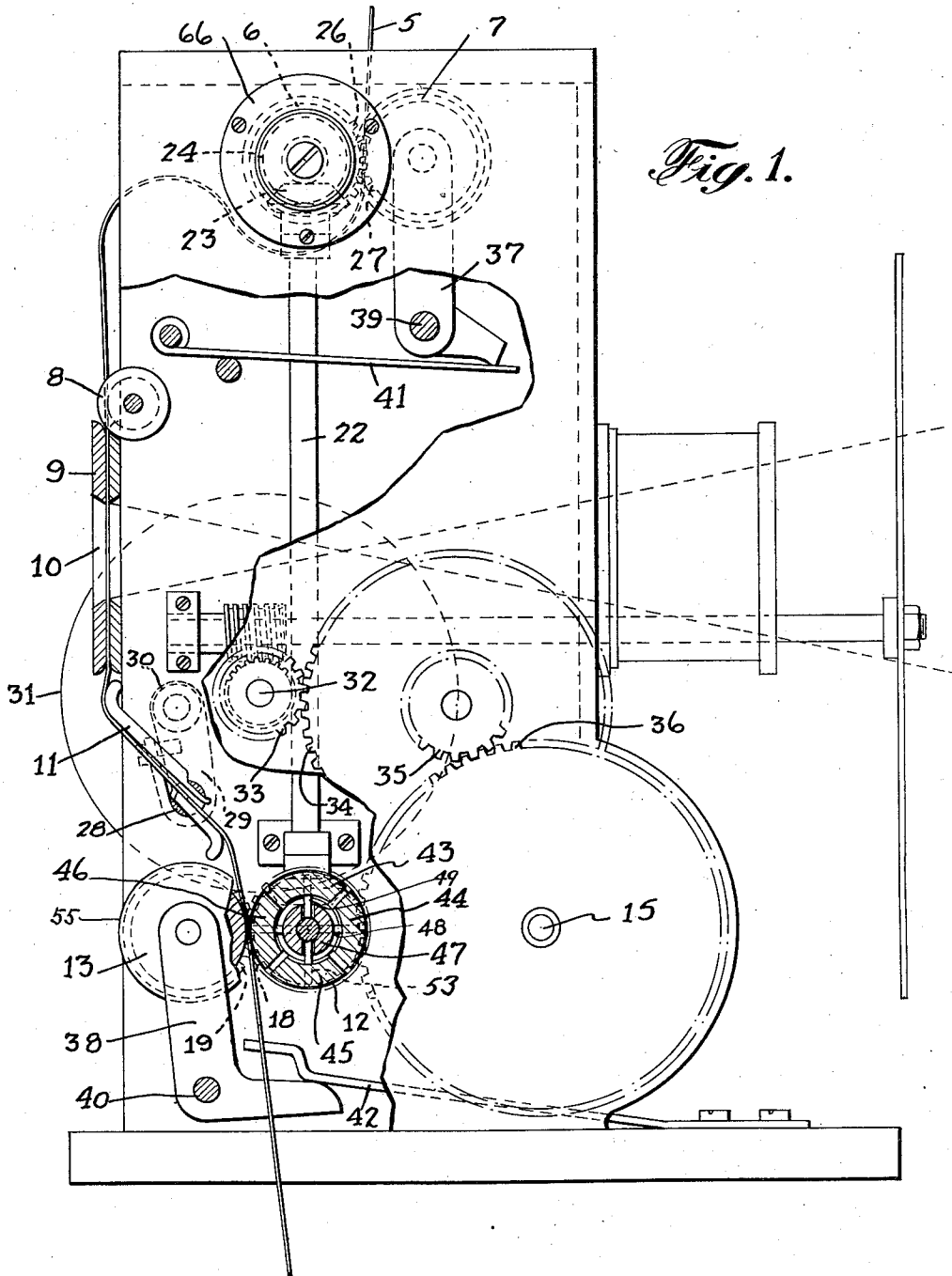
Sept. 16, 1924.

1,508,673

G. W. BINGHAM
MOVING PICTURE MACHINE

Filed Jan. 8, 1924

2 Sheets-Sheet 1



INVENTOR
GEORGE W. BINGHAM

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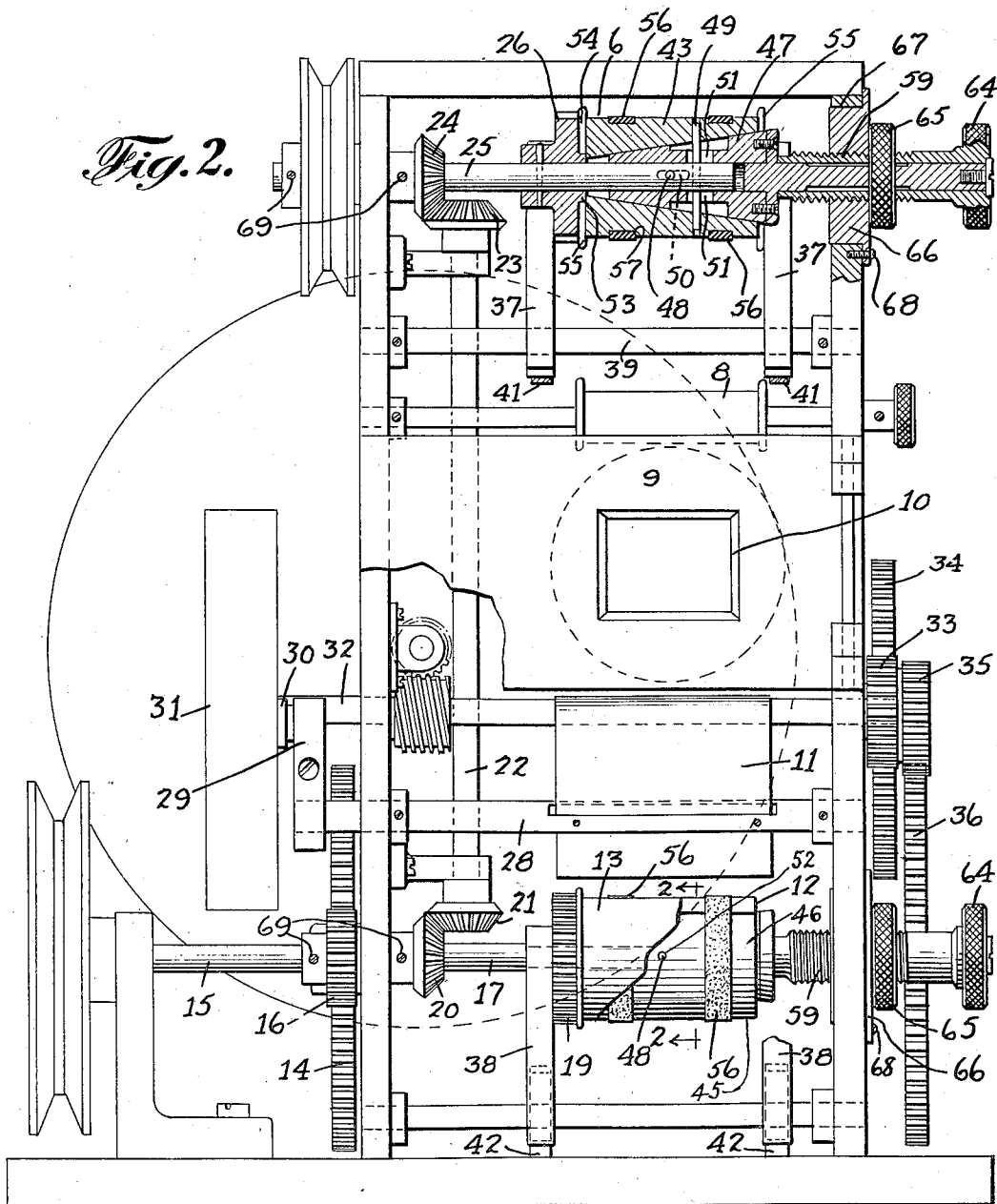
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UNITED STATES PATENT OFFICE.

GEORGE W. BINGHAM, OF NEW YORK, N. Y.

MOVING-PICTURE MACHINE.

Application filed January 8, 1924. Serial No. 684,925.

To all whom it may concern:

Be it known that I, GEORGE W. BINGHAM, a citizen of the United States, and a resident of the city, county, and State of New York, have invented certain new and useful Improvements in Moving-Picture Machines, of which the following is a specification.

This invention relates in particular to machines of the type in which the film is intermittently advanced past the exposure opening by an oscillating heater operating in conjunction with continuously rotating rolls which feed the film and hold it against retrograde movement during the advancing action of the beater.

The shrinkage of the film in the course of development, and this occurs both in the development of the negative and in the development of the positive, introduces certain variables which, in view of the constant stroke of the advancing mechanism, has a tendency at times to cause the pictures to "creep" either up or down on the screen.

One of the principal objects of this invention is to provide simple and practical means for overcoming this creeping tendency and for keeping the pictures at all times in proper register on the screen.

Another important object of the invention is to provide a machine which will be capable of handling the so-called "non-inflammable" film which is now available but which is too brittle and stiff to be successfully handled by the machines in use at the present time.

The foregoing and other objects are attained in this invention through the employment of certain novel features of construction, combination and relation of parts, as will appear from the following specification.

The drawings, forming part of the specification, illustrate but one of the many possible embodiments of the invention and it is therefore to be understood that the structure may be modified and changed without departure from the broad spirit and scope of the invention as hereinafter defined and claimed.

Figure 1 is a broken side elevation of a projecting machine having the invention incorporated therein, parts of the mechanism appearing in section.

Figure 2 is a broken front elevation of the machine with parts here also appearing in section.

The general operation of the machine will

be clear from Figure 1 where 5 designates the film coming from a suitable supply reel and extending down first between cooperating feed rolls 6, 7, over a guide roll 8, beneath the gate or clamp 9, past the exposure opening 10 and thence beneath the oscillating beater 11 to the co-operating rolls 12, 13.

Both sets of film feeding rolls are positively driven, in the illustration, through a train of gearing, involving a gear 14 on the drive shaft 15 of the machine, in mesh with a pinion 16 on the shaft 17 of roll 12 which drives its companion roll by a gear 18 meshing with gear 19 on the companion roll 13; the lower roll shaft 17 through bevel gears 20, 21, drives a vertical shaft 22 which by bevel gears 23, 24 drives the shaft 25 of the upper feed roll 6, said shaft also carrying a gear 26 in mesh with the gear 27 on the cooperating roll 7.

The beater is shown as carried by a rock shaft 28 and as oscillated by a rocker arm 29 having a roll 30 in engagement with a cam groove in the balance wheel 31, the latter being mounted on a shaft 32 having a pinion 33 in mesh with the gear 34 which carries a pinion 35 in engagement with a gear 36 fixed on the end of the main drive shaft 15.

To overcome the creeping effect and keep the film running true, one of the film feeding rolls of each set is made expansible and contractible and means are provided by which the same can be adjusted at will during the operation of the machine. Thus in the illustration, the upper roll 6 and the lower roll 12 have a radially expansible adjustment and the companion rolls 7, 13 are of a fixed diameter and driven continuously and positively from the adjustable rolls. To enable the fixed rolls to accommodate themselves to the variable diameters of the adjustable rolls, they are shown as mounted in bearing brackets 37, 38 respectively pivoted at 39 and 40 and acted on by springs 41, 42 which serve to hold the co-operating rolls yieldingly pressed together against the film in all of the roll adjustments.

The peripherally adjustable rolls 6 and 12 are of similar construction so that a description of one will suffice for both. The body of each of these rolls is shown as made up of four segments 43, 44, 45, 46, of cylindrical outside form but of conical internal shape to receive and bear upon the conical

sleeve 47 which is slidably engaged over the roll shaft. This sleeve and the roll segments are all keyed on the roll shaft by pins 48, 49 shown as driven through the shaft at right angles to each other and as projecting through longitudinal slots 50, 51 in the conical wedging sleeve into radial bearings 52 and 53 in the segments 44 and 46 and 43—45 respectively.

In Figure 2 the segments are indicated as having a bearing against a shoulder 53 on the drive gear and this shoulder is offset from the face of the gear so as to provide an annular space 54 at the end of the roll to receive one of the end flanges 55 of the companion roll. These overlapping end flanges are a further aid in guiding the roll segments and also help to keep the film running straight between the rolls.

The roll segments are held together and contracted upon the spreading cone in the present disclosure by two contracting rings 56. These rings are shown as located in shallow grooves 57 disposed near the opposite ends of the roll and as projecting slightly above the surface of the roll segments. Thus when the contracting rings are made of rubber, as indicated, they will take hold of the film with a frictional gripping force. This is a desirable aid in the feeding and guiding of the film, but is not relied upon for the actual feeding because of the yielding impositive characteristics of the same. The actual feeding is effected in a definite manner by the engagement of the roll surfaces with the film and the rubber bands serve in an auxiliary capacity to provide a firmer grip on the film and prevent any slippage.

The conical adjusting sleeve is shifted in the present disclosure by means of a screw sleeve 58 supported in a screw seat 59. To provide a rotating connection between the cone and screw sleeve, the cone is shown as having a plate 60 attached to the larger, outer end of the same, carrying a shaft extension 61 rotatably supported in the screw sleeve and forming, in effect, a continuation of the main shaft, which terminates within the conical sleeve at 62. The plate 60 has a bearing against the inner end of the screw sleeve and the shaft extension 61 carries a screw 63 bearing against the outer end of the screw sleeve so that the screw sleeve is capable of exerting either a pushing or a pulling force on the conical sleeve and without interfering with the free rotation of said conical sleeve.

The screw sleeve is shown provided with a knob or handle 64 on its outer end and a lock nut 65 is shown engaged on the shank of the screw for securing it in any adjusted relation.

To enable a ready removal of the peripherally adjustable roll for repair or other

purposes, the bearing for the screw sleeve may be in the form of a removable plug or plate 66 seated in or covering an opening 67 in the side frame of the machine which is large enough to pass the completely assembled roll. This plug is shown as removably secured in place by means of screws 68 and it will be evident that upon removal of these screws and the removal of such screws or pins as may hold the shaft against endwise displacement, such as the screws indicated at 69 in Figure 2, the entire shaft assembly, carrying the adjustable roll may be withdrawn through the side of the frame.

With this invention just as soon as any "creeping" tendency of the picture is observed, the same is immediately corrected by simply turning the adjusting knob 64 of the lower feed or take-up roll 12. Very slight variations in the size of the roll are instantly observable on the screen so that the pictures can be immediately brought back into register. When such adjustments of the take-up or advancing roll are made, the action of the upper or film forwarding rolls should be observed and if necessary, the adjustable one of these rolls should be set by means of its knob 64 to advance the film at either a greater or a lesser rate in correspondence with the action of the film advancing means. The invention thus makes it possible at any time in the operation of the machine to adjust either the rate of film advancement or the size of the loop, or both, to compensate for variations or irregularities in the film or to meet other conditions which may arise.

The upper adjustable roll is usually set as indicated in Figure 1 so as to provide sufficient of a loop without imparting too abrupt a bend in the film and as the film passes through the machine in almost a straight line, it has been found possible to handle film in this machine which is too brittle and stiff to be successfully handled by machines now in use. The non-inflammable film which has been proposed for educational pictures is of this type, that is, so stiff and brittle that it breaks and tears and will not bend around the sprockets in the ordinary type of machine. The present machine is capable of successfully handling this non-inflammable film and does not require that the film be perforated, which is one of the causes of breakage of such film. Another advantageous feature of the present machine is that it is capable of handling perforated film which has become too worn for use in sprocket machines and any necessary adjustments can be quickly made no matter how old and worn the film may be.

What I claim is:

1. In a motion picture machine having an exposure opening, cooperating continuously rotating rolls for feeding the film to the ex-

posure opening, a beater for intermittently advancing the film past the exposure opening and cooperating continuously rotating take-up rolls for advancing the film and holding the same against retrograde movement during action of the beater, means for varying the peripheral size of one of the take-up rolls during the rotation of the same to regulate the length of film advanced at each stroke of the beater and means for correspondingly varying the peripheral size of one of the feed rolls during the rotation of the same to feed the film to the advancing mechanism at a proportionately greater or lesser peripheral speed.

2. A combination as in claim 1 in which the periphery-varying means comprises in each instance a plurality of segments forming the body of the roll held together by encircling elastic bands spaced lengthwise of the roll and separated to a greater or lesser extent by longitudinally shiftable wedging means.

3. A combination as in claim 1 in which the rolls cooperating with the peripherally variable rolls are mounted in bearings yieldable to accommodate such rolls to the varying adjustments.

4. A combination as in claim 1 in which the rolls cooperating with the peripherally variable rolls have end flanges engageable over the ends of the variable rolls.

5. A combination as in claim 1 in which the periphery-varying means comprises in each instance a plurality of segments forming the body of the roll held together by encircling elastic bands spaced lengthwise of the roll and separated to a greater or lesser extent by longitudinally shiftable wedging means, the rolls cooperating with the variable rolls having end flanges engageable over the ends of the roll segments.

6. A combination as in claim 1 in which the variable rolls each comprise a shaft with transversely projecting pins, a conical sleeve slidably engaged on the shaft and slotted for the passage of said pins, radially movable segments engaged on said pins and elastic bands encircling said segments.

7. A combination as in claim 1 in which the variable rolls and the adjusting means therefor are each carried by a plate of larger diameter than the roll and removably secured to the frame of the machine over an opening which is of a size sufficient to pass the entire roll.

8. In motion picture apparatus, cooperating film feeding rolls yieldable with respect to each other to grip the film passing therebetween, one of said rolls having expansibly related segments with longitudinally separated peripheral grooves therein, elastic bands seated in said grooves and means for relatively expanding and contracting the segments.

9. In a moving picture machine, yieldably related cooperating film feeding rolls, one of said rolls having radially shiftable segments with a peripheral groove therein, a contracting ring seated in said groove and adjustable wedging means engaged with said segments.

10. In a moving picture machine, a film engaging roll consisting of expansibly related segments having a peripheral groove therein, a contracting ring of elastic frictional material seated in said groove and projecting slightly above the surface of the segments and means for shifting the segments to effect an expansion or contraction in the size of the roll.

11. In a moving picture machine, a shaft carrying radially projecting pins, a conical sleeve slidably engaged on said shaft and slotted for the passage of said pins, roll segments engaged on said pins and bearing on the conical sleeve, a contracting ring encircling the segments and means for shifting the conical sleeve longitudinally of the shaft.

12. In a moving picture machine, a shaft having radially projecting pins, a conical sleeve slidably engaged on the shaft and slotted for the passage of said pins, segments bearing on the conical sleeve and engaged over the projecting end portions of the pins, said segments having a peripheral groove therein, a contracting ring seated in said groove and a screw sleeve surrounding the shaft and engaged with the conical sleeve for shifting the same longitudinally of the shaft.

13. A moving picture machine having a frame provided with an opening large enough for the passage of a film feeding roll therethrough, a plug removably secured in said opening and provided with a screw passage therethrough, a screw sleeve seated in said passage, a shaft having a bearing in said sleeve, a conical sleeve on the shaft and engaged by the screw sleeve and roll segments secured in engagement over the conical sleeve.

14. In a moving picture machine, a shaft having a thrust shoulder and carrying radially projecting keys, a conical sleeve slidable on the shaft and slotted for passage of said keys, roll segments bearing on the conical sleeve and having a radially adjustable engagement over the keys, a contracting ring encircling the roll segments and a screw sleeve surrounding the shaft and engaged with the conical sleeve.

15. In a moving picture machine, a shaft having a thrust shoulder and carrying radially projecting keys, a conical sleeve slidable on the shaft and slotted for passage of said keys, roll segments bearing on the conical sleeve and having a radially adjustable engagement over the keys, a contracting

ring encircling the roll segments, a screw sleeve surrounding the shaft and engaged with the conical sleeve and a removable bearing having a screw passage forming a seat for the screw sleeve.

16. In a moving picture machine, a shaft having a thrust shoulder and carrying radially projecting keys, a conical sleeve slidable on the shaft and slotted for passage of said keys, roll segments bearing on the conical sleeve and having a radially adjustable engagement over the keys, a contracting ring encircling the roll segments, a screw sleeve surrounding the shaft and engaged with the conical sleeve, a removable bearing having a screw passage forming a seat for the screw sleeve and a lock nut on the screw sleeve adjustable into engagement with the face of said bearing.

17. A combination as in claim 1 in which the periphery varying means comprises in

each instance a plurality of segments forming the body of the roll held together by an encircling elastic band seated in a peripheral groove in the segments and separated to a greater or lesser extent by a longitudinally shiftable conical member.

18. In a moving picture machine, a shaft, a longitudinally shiftable conical sleeve slidably engaged over one end of said shaft and carrying an extension of said shaft, an adjusting sleeve engaged over said shaft extension for shifting the conical sleeve in opposite directions over the shaft, radially shiftable roll segments keyed to rotate with the shaft and bearing on the conical sleeve and contractable means for holding the roll segments engaged with the conical sleeve.

In witness whereof, I have hereunto set my hand this 4th day of January, 1924.

GEORGE W. BINGHAM.