

June 21, 1938.

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2,120,989

MECHANICAL DRIVE

Filed April 20, 1934

FIG. 1

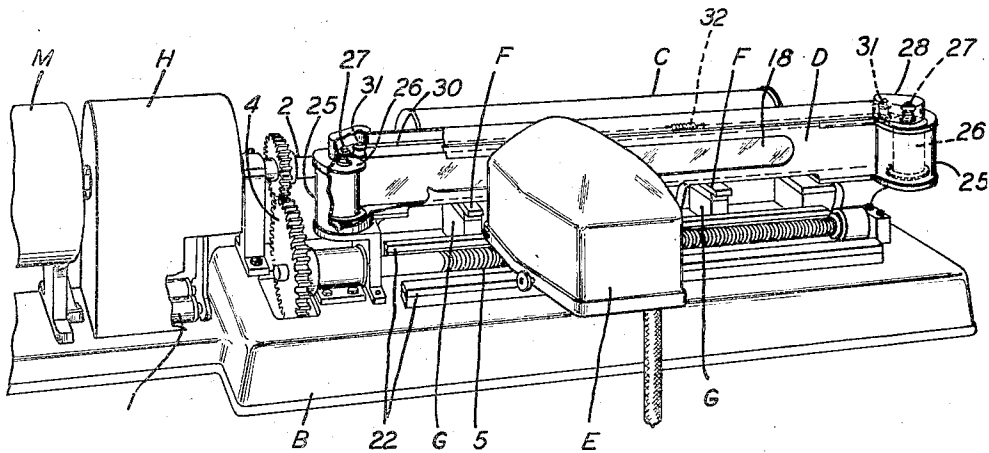
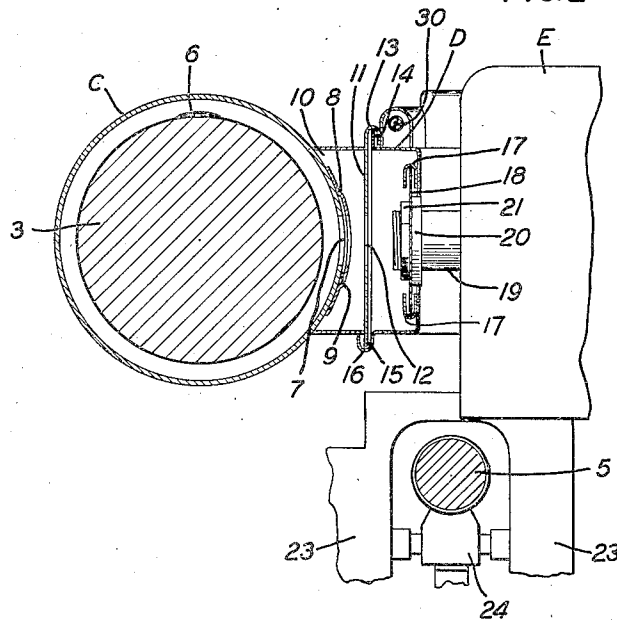


FIG. 2



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2,120,989

MECHANICAL DRIVE

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Application April 20, 1934, Serial No. 721,505

12 Claims. (Cl. 178—7.4)

The present invention relates to a mechanical drive and more particularly to means for driving a flexible member.

An object of the invention is to effect longitudinal movement of a straight flexible member by means connected intermediate the length of the member without causing it to buckle or bend.

Another object is to control the flexible member from the intermediately connected driving means in such manner that both end portions are under tension.

The invention will be hereinafter described as applied to an extremely flexible opaque curtain constituting an element of the receiving or recording apparatus of a picture transmission system adapted for use in an illuminated room or compartment.

One form of picture receiving or recording apparatus to which the invention may be applied comprises a rotatably driven cylinder having a light sensitive film mounted thereon, the film loaded cylinder being enclosed in a light-proof container provided with a longitudinally slotted extension which engages a housing for a trackway in which a flexible curtain may be moved back and forth with respect to the container, by a longitudinally driven optical system having a tubular extension which projects through a slot in the housing and through an opening in the curtain at a point intermediate its length, through which extension and opening a spot of intense light of small dimension may be directed to the light sensitive film carried by the cylinder. The housing for the trackway is provided with a longitudinal slot aligned with the slot in the container and, at its respective ends, comprises cylindrical portions which respectively enclose rollers to which the ends of the curtain are connected and on and off which respective sections of the curtain may be wound and unwound, depending upon the direction of movement of the optical system. Integral with the respective rollers or secured thereto are pulleys which are coupled by a belt or cord, the cord is applied to the pulleys in such manner that when the optical system moves in either direction to apply tension to one section of the curtain, which for convenience may be called the following section, to unwind the curtain from one of the rollers, the other roller is rotated by the belt in such direction as to wind thereon the section of the curtain preceding the optical system, i. e., the advance section, whereby tension is applied to this

section with the result that such advance section does not tend to bend or buckle.

Preliminary to the recording operation a photographic film is mounted on the cylinder which is inserted in the container in a dark room, the slot in the extension is closed by a shutter which excludes light therefrom while the container is being transferred from the dark room through the illuminated compartment to the apparatus. After the container has been applied to the apparatus with its slotted extension in engagement with the trackway housing, and hence in position to have its slot sealed by this housing and the movable curtain, the shutter is removed. During the recording operation the intensity of the spot of light supplied by the optical system is controlled in accordance with the changing values of the incoming picture current to provide a spot of light of varying intensity, and, due to the relative motion of the cylinder and optical system, this varying light spot is caused to scan the light sensitive surface in a succession of spiral traces, to produce a record of the subject scanned at the transmitter.

A more detail description of the invention follows and is illustrated in the attached drawing, wherein

Fig. 1 shows a view in elevation of a picture receiver having the invention applied thereto, with parts broken away; and

Fig. 2 illustrates a cross-section of the picture receiver with parts in elevation.

Referring to the drawing, there is shown a picture receiver comprising a base B for supporting the recording apparatus, including a motor M connected by a clutch, enclosed by the housing H, a container C which encloses a cylinder having a light sensitive film mounted thereon, a housing D which is provided with a trackway for the curtain and encloses rollers on and off which the curtain may be wound and unwound and a housing E enclosing an optical system.

The motor M is adapted to be coupled by a clutch 1, diagrammatically indicated as an electromagnetically controlled unit, to a drive shaft 2 which is directly connected to the cylinder 3, enclosed within the light-proof container C, and through gearing 4 to a lead screw 5, which drives the optical system longitudinally of the apparatus and hence longitudinally of the cylinder 3.

The optical system is designed to supply a spot light of the desired configuration and of small dimensions which is focussed on the light sensitive recording surface or film carried by the cylinder 3. The light spot is controlled by incoming

picture current to vary in intensity in accordance with the tone values of the successive elemental areas of the subject scanned at the transmitter. By virtue of the rotation of the cylinder and the longitudinal movement of the optical system, which are effected in synchronism and in phase with a similar scanning mechanism at the transmitter, the varying spot of light scans the light sensitive surface in a succession of spiral traces to produce a record of the subject scanned at the transmitter. The clutch 1 may be of any suitable type, such as, for example, of the design disclosed in U. S. Patent 2,105,897, of C. C. Towne, issued Jan. 18, 1938.

The optical system is not a feature of this invention and hence further description thereof appears to be unnecessary. However, the apparatus is to be used in a normally lighted room or compartment and hence provision must be made to permit the spot of light to illuminate successive elemental areas of the light sensitive material carried by the cylinder 3 and, at the same time, to exclude from the container light supplied by the source illuminating the room or compartment in which the apparatus is installed.

As shown in Fig. 2 the cylinder 3 is provided with a strip 6 for holding a sheet of light sensitive material in intimate contact with its surface. Any suitable means may be used to secure the light sensitive material to the cylinder. A satisfactory arrangement for this purpose is disclosed in U. S. Patent 2,085,093 of M. C. Gauthier, issued June 29, 1937. After the sheet has been secured to the cylinder in a dark room, it is enclosed in the light-proof container C which is provided with a longitudinally extending slot 7. A flanged plate 8 is associated with the slot and cooperates with the external surface of the container to provide a guideway 9, into which a shutter may be inserted after the film loading operation has been completed and before the container is removed from the dark room.

The slotted section of the container C is provided with an extension 10, comprising side and end walls secured in light-proof engagement therewith and a face plate 11 having a slot 12 in alignment with the slot 7. The upper end of plate 11 has an extended hook-shaped portion 13 adapted to engage a flange 14 provided on the adjacent wall of the housing D, and a depending flange 15 engaging a beading 16 also carried by this housing. The container C is supported by depending legs F which engage bearing blocks G carried by the base B. The housing D is provided with U-shaped members 17 adapted to provide a trackway for a sliding curtain 18.

The optical system, enclosed by the housing E, is provided with a tubular extension 19 which projects through a slot in housing D and through an opening in the curtain 18. This extension is provided with a flange 20 against which the curtain is seated and securely held by the nut 21. This system is mounted on a base supported on rails 22, and the base is provided with depending arms 23 which carry a nut 24 adapted to be moved into and out of engagement with the lead screw 5 by a lever (not shown).

The ends of the housing D are provided with cylindrical casings 25, each of which encloses a roller 26 having formed integrally therewith, or secured thereto, a pulley 27, and the pulleys are enclosed by an extending portion 28 supported by the casings 25.

The respective ends of the curtain 18 are attached to the rollers 26, and a driving belt 30,

after passing over idler pulleys 31 included in the extension 28, has its respective ends attached to the pulleys 27. This belt is provided intermediate its length with a spring 32, which serves to compensate any variations in the tension transmitted through it.

The apparatus is prepared for the recording operation in a dark room by securing a film on the cylinder 3 and inserting the shutter in place in the slideway 9, the container C is attached to the apparatus installed in a lighted room or compartment with its slotted extension 10 in engagement with the housing D, the shutter is removed, and the optical system adjusted to the right hand end of the machine.

To effect recording, the motor is connected to the power source and the clutch actuated to connect it to the drive shaft 2, whereby the cylinder and lead screw are rotated and the optical system is driven by the lead screw in a direction toward the left hand end of the machine, with the result that the curtain moves toward the left and a tension is thereby applied to the section of the curtain connecting the optical system with the right hand roller 26, i. e., the following section of the curtain. This right hand roller and its associated pulley 27 are thereby caused to rotate in a counter-clockwise direction. The driving belt 30, after passing over the right hand idler 31, is so wound on the right hand pulley 27 that, as the curtain moves toward the left to rotate the right hand pulley 27 and its associated roller 26 in a counter-clockwise direction, the belt moves toward the right and after passing over the left hand idler 31, is applied to the left hand pulley 27 in such manner that both it and the associated roller 26 are rotated in a counter-clockwise direction; whereby the curtain is wound on this roller to apply a tension to the section of the curtain connecting it to the optical system, i. e., the section to the left of the optical system or the advance section. When the recording operation is completed, the optical system, which may either be at the left hand end of its path of travel or at some point to the left of the starting position, is disconnected from the lead screw and may then be manually moved to any desired position. Assuming that the optical system is returned to the starting position, the left hand section of the curtain, i. e., the section connecting it with the left hand roller 26, or, in other words, the following section, will be under tension and will thereby cause the left hand roller 26 and its associated pulley 27 to rotate in a clockwise direction, the driving belt will be wound on the left hand pulley and unwound from the right hand pulley which is thereby rotated in a clockwise direction as is also its associated roller; with the result, that the curtain is wound on the right hand roller and a tension is applied to the portion of the curtain connecting it with the optical system, i. e., the section to the right of the optical system which has now become the advance section. During these operations the spring 32 serves to keep the belt and thereby the curtain 18 under constant tension.

The present invention, therefore, provides an arrangement in which a straight flexible member may be moved longitudinally in either direction by a driving force applied intermediate its length in such manner that, irrespective of the direction of the applied force and hence the direction of movement of the member, a uniform tension is applied to the sections of the member

on opposite sides of the point of application of the driving force.

What is claimed is:

1. A picture receiving apparatus comprising a light-proof casing enclosing a light sensitive film carried by a rotatable member and provided with a longitudinally extending slot, a straight flexible member for continuously sealing said slot, supports for said member, means for connecting the respective ends of said member to said supports, means connected to said member intermediate its length for moving said member longitudinally of said slot, and means for maintaining under tension the sections of said member on opposite sides of said point of intermediate connection, said last-mentioned means comprising means, controlled by the means for effecting longitudinal movement of said member, for actuating said supports to apply tension to one of said sections.
2. A picture receiving apparatus comprising a light-proof casing enclosing a light sensitive film carried by a rotatable member and provided with a longitudinally extending slot, a straight flexible member for continuously sealing said slot, supports for said member, means for connecting the respective ends of said member to said supports, means connected to said member intermediate its length for moving said member longitudinally of said slot, and means, controlled by the means for effecting longitudinal movement of said member and coupling said supports, for causing the section of said member on one side of said connecting point to apply a tension to the section of said member on the other side of said connecting point.
3. A picture receiving apparatus comprising a light-proof casing enclosing a light sensitive film carried by a rotatable member and provided with a longitudinally extending slot, a straight flexible member for continuously sealing said slot, supports for said member, means for connecting the respective ends of said member to said supports, means connected intermediate the length of said member for moving it longitudinally of said slot and for thereby applying a tension to one section thereof, and means for coupling said supports, said coupling means being controlled by the means for effecting longitudinal movement of said member to apply tension to the other section of said member.
4. A picture receiving apparatus comprising a light-proof casing enclosing a light sensitive film carried by a rotatable member and provided with a longitudinally extending slot, a straight flexible member for continuously sealing said slot, supports for said member, means for connecting the respective ends of said member to said supports, means connected intermediate the length of said member for moving it longitudinally of said slot in either direction, and means for maintaining the sections of said member between the intermediate connecting point and the respective supports under uniform tension as the member is moved in either direction, said means comprising means coupling said supports, and operable by movement of said member to transfer tension from one section to the other.
5. An electro-optical apparatus comprising a container enclosing a rotatable light sensitive film and provided with a longitudinally extending slot, a straight flexible member for sealing said slot, rollers on and off which sections of said member may be wound and unwound, respectively, means connected intermediate the length of said member for unwinding one section from one of said

rollers, and means controlled by said unwinding operation for winding the other section of said member on the other roller.

6. An electro-optical apparatus comprising a container enclosing a rotatable light sensitive film and provided with a longitudinally extending slot, a straight flexible member for sealing said slot, rollers to which the respective ends of said member are connected, optical means connected intermediate the length of said member to move it longitudinally and thereby apply tension to one section of said member for unwinding said section from one of said rollers, and means controlled by said tensioned section for rotating said other roller to apply tension to the other section of said member.

7. An electro-optical apparatus comprising a container enclosing a rotatable light sensitive film and provided with a longitudinally extending slot, a straight flexible member for sealing said slot, rollers to which the respective ends of said member are connected, tensioning means for coupling said rollers, and means connected intermediate the length of said member for moving it longitudinally to apply tension to one section of said member and thereby rotate said rollers to actuate the tensioning means to apply tension to the other section of said member.

8. A picture receiving apparatus comprising a light-proof container enclosing a light sensitive film carried by a rotatable cylinder and provided with a longitudinally extending slot, means for continuously sealing said slot including a flexible member, an optical system having a light outlet aligned with said slot, means for connecting said optical system in an aperture intermediate the length of said member, means for moving said optical system and said member longitudinally of said slot to thereby cause tension to be applied to a section of said member on one side of said optical system, and auxiliary means for applying a similar tension to the section of said member on the other side of said optical system, said auxiliary means being actuated by the movement of said optical system.

9. A picture receiving apparatus comprising a light proof casing enclosing a light sensitive film carried by a rotatable member and provided with a longitudinally extending slot, a straight flexible member for continuously sealing said slot, supports therefor having surfaces substantially in the plane of said member, means for securing the respective ends of said member to said supports, means connected to said member at a point intermediate its length for moving it longitudinally of the slot, and means associated with said supports for maintaining under tension the sections of said member on opposite sides of said point of connection.

10. A picture receiving apparatus comprising a light proof container enclosing a light sensitive film carried by a movable member and provided with a longitudinally extending slot, a straight flexible member for continuously sealing said slot and having its respective ends connected to rotatable supports, means for moving said member longitudinally of said slot, and means for permanently connecting said means for effecting longitudinal movement at a point intermediate the length of said sealing member.

11. A picture receiving apparatus comprising a light proof container enclosing a light sensitive film carried by a movable member and provided with a longitudinally extending slot, a straight flexible member for continuously sealing said slot

and having its respective ends connected to rotatable supports, means for moving said member longitudinally of said slot, means for permanently connecting said means for effecting longitudinal movement at a point intermediate the length of said sealing member, and means for applying a force to at least one of said rotatable supports to cause it to exert a pull upon said flexible member in the direction of the push exerted thereon by said means for longitudinally moving said member.

12. A picture receiving apparatus comprising a light proof container enclosing a light sensitive film carried by a movable member and provided with a longitudinally extending slot, a straight flexible member for continuously sealing said slot

and having its respective ends fixedly connected to rotatable supports, an aperture in said flexible member, a carriage, a light proof container on said carriage, a light proof rigid coupling fixed to said container and said flexible member at said aperture, means for driving said carriage to thereby move said flexible member longitudinally of said slot and cause the end portions thereof to be wound on said rotatable supports, and means for applying a force to one of said rotatable supports to cause it to exert a pull upon the part of said flexible member upon which a push is exerted by said coupling means when said carriage is moved.

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