

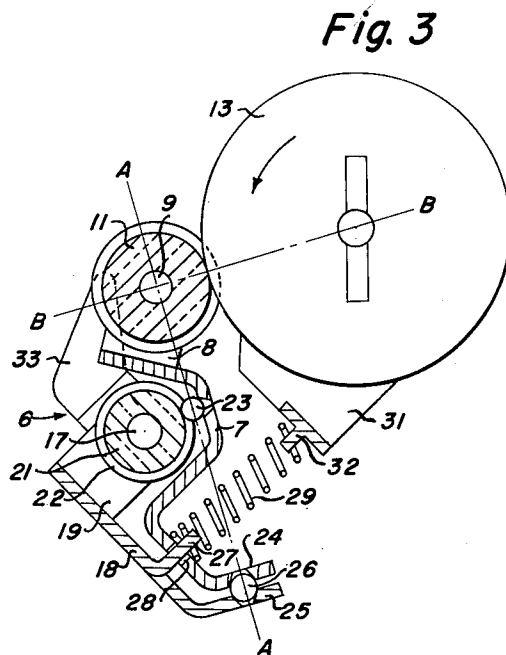
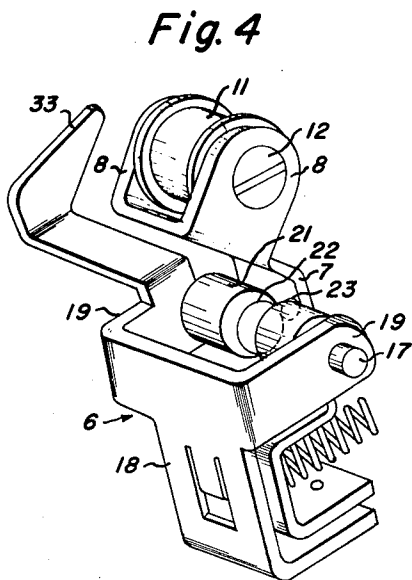
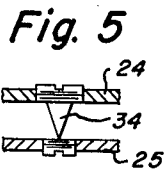
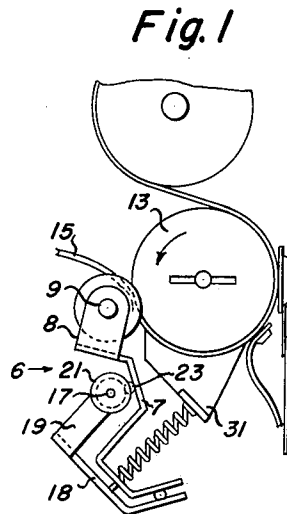
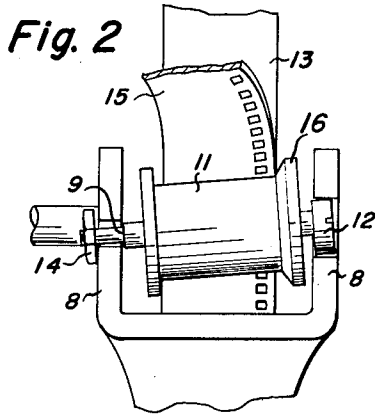
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PRESSURE ROLLER MECHANISM

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PRESSURE ROLLER MECHANISM

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This invention relates generally to pressure rollers, and more specifically to an improved pressure roller mechanism for a moving picture sound projector and the like for pressing a web such as a film against a drum and guiding the film on the drum to maintain it in a fixed position relative thereto.

It is generally old in the moving picture sound projector art to provide a pressure roller biased into engagement with a sound drum for accomplishing the following objectives: (1) isolating the vibrating movement of the film loop from the sound system, (2) maintain a constant film wrap around the sound drum, (3) apply a pressure to the film to prevent film slippage on the drum, and (4) guide or steer the film so that its sound track is maintained in a constant position with respect to the projector recording and reproducing device. Although most of the prior known pressure roller mechanisms accomplish the above-indicated objectives in a satisfactory manner, they suffer from the serious disadvantage of introducing undesired frequencies below 10 cycles per second which modulate the reproduced sound on the sound track. These undesired frequencies are commonly referred to in the industry as "wow."

It is well known that for ideal reproduction of sound in a sound projector, the sound track must be transported past the sound-recording and reproducing device at a constant speed. Any irregularities in the drive sprocket system, irregularities in the sound drum and shaft upon which it is rotated, and improper articulation of the pressure roller will tend to periodically vary the speed at which the film is transported past the sound-recording and reproducing device, thereby introducing "wow" into the system which interferes with the clear reproduction of the sound. Efforts are constantly being made to minimize the introduction of "wow" into the sound system, and in this invention we are concerned with accomplishing this by the use of an improved articulated pressure roller mechanism.

In any pressure roller system that we are aware of, the pressure roller is biased into engagement with the periphery of the sound drum which normally is provided with a peripheral undercut portion to prevent marring or scratching the film emulsion. The roller is rotatable about its axis and is movable as a unit toward and away from the sound drum. The roller, however, is not capable of what is referred to in the industry as articulated motion, namely, the ability to turn about an axis passing through the midpoint of the roller axis and substantially perpendicular to a plane including the sound drum axis and the midpoint of the roller.

Although manufacturers strive to produce a film of constant thickness, as a practical matter it is impossible to achieve this result and consequently the film produced varies in thickness along its length and width. With a fixed roller, the roller is not capable of articulated motion and accordingly cannot adapt itself to the varying thicknesses of the film. Consequently, the force exerted by the roller against the film varies in proportion to the film thickness causing the speed at which the film is transported past the sound-recording and reproducing device to vary thereby introducing "wow" into the system. The introduction of "wow" into the sound system as a result of the non-uniformity of the film, is more pronounced

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and troublesome as the width of the film, and the speed at which the film is transported past the sound-recording and reproducing device decreases. For example, in a 16 mm. sound projector, for a predetermined deviation along one edge of the film, the pressure roller would have to be capable of articulated motion through a predetermined angle to compensate for this deviation. In an 8 mm. sound projector, for the same deviation in the film, the pressure roller would have to move through approximately twice the angle since the roller is only one-half as long as the roller used for spanning the 16 mm. film. In addition, the film in the 8 mm. projector is transported at approximately one-half the speed of the film in the 16 mm. projector so that any of the "wow" resulting from irregularities in the thickness of the film is more pronounced and troublesome.

One of the primary reasons why an articulated roller system for reducing "wow" has not been adopted by the industry is because the friction of the moving parts involved is so large that the roller is not able to faithfully follow the contour of the rapidly moving film surface. To reduce the friction of the moving parts of the pressure roller system to the point where the roller can readily follow the contour of the film without creating excessive pressures where the film is thicker than normal and an insufficient pressure where the film is thinner, it is necessary to machine, harden and polish the parts to extremely close tolerances, increasing the cost of the pressure roller system to the point where it is prohibitive. Furthermore, even where the pressure roller system is precision made, it is extremely difficult to get the pressure roller to faithfully reassume its original position once it has been withdrawn from the sound drum for threading or some other purpose.

Accordingly, one of the primary objects of the present invention is to provide an articulated pressure roller mechanism for a sound projector that is believed to obviate all of the above-indicated disadvantages of prior-known pressure roller systems.

Another object of this invention is to provide an improved pressure roller mechanism for a sound projector in which the pressure roller is capable of articulated motion.

Still another object of this invention is to provide an improved pressure roller mechanism for a sound projector that minimizes the "wow" introduced into the sound system.

Another important object of the invention is to provide an articulated pressure roller mechanism for a sound projector in which the friction of the moving parts opposing proper articulation of the pressure roller is minimized to the point where it is no longer objectionable.

Still another object of the invention is the provision of an improved pressure roller mechanism for a sound projector that is movable between operative and inoperative positions and adapted to faithfully return to its operative position.

A further object of the invention is to provide an improved pressure roller mechanism in which the pressure roller is mounted on ball bearings.

Another important object of the invention is to provide an improved pressure roller mechanism for a sound projector that is extremely accurate and precise although many of its parts are made from inexpensive and inaccurate stampings.

Still another object of this invention is the provision of an improved pressure roller mechanism for a sound projector that is of simple design and construction, thoroughly reliable and efficient in operation, and economical to manufacture.

Objects and advantages other than those set forth above will be apparent from the following description when

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read in connection with the accompanying drawing, in which:

FIG. 1 is an end elevation view of a preferred embodiment of the pressure roller mechanism of this invention;

FIG. 2 is a fragmentary enlarged side elevation view of the pressure roller of FIG. 1;

FIG. 3 is an enlarged elevation view similar to FIG. 1 with a portion thereof sectional;

FIG. 4 is a perspective view of the pressure roller mechanism; and

FIG. 5 is a fragmentary view of an alternative form of pivot for the pressure roller mechanism.

Referring to the drawing, a pressure roller mechanism 6 is disclosed for use in a sound moving picture projector, not shown, of the normal type having a casing provided with film supply and take-up reels mounted therein, a film gate through which a film is intermittently moved by some suitable pulldown mechanism, a lens through which the film image is projected, a sound recording and reproducing mechanism including the pressure roller mechanism 6 of this invention, and a drive sprocket for drawing the film from the supply reel through the film gate and sound-recording and reproducing mechanism for winding on the take-up reel.

The pressure roller mechanism 6 of this invention comprises a substantially inverted S-shaped bracket 7 as best seen in FIG. 3. One end of bracket 7 has upturned flanges 8 for supporting a shaft 9 on which a pressure roller 11 is rotatably mounted, as best seen FIG. 2. The shaft 9 has an eccentric head 12 at one end extending into an opening in one of the flanges 8 and is adapted when rotated to adjust the degree of tilt of pressure roller 11 with respect to a sound drum 13 upon which it bears. Once the correct tilt of roller 11 has been achieved, a lock screw 14 is tightened to lock shaft 9 to flanges 8 in that position. Accordingly, when pressure roller 11 exerts pressure against a film 15 and drum 13, and the drum is rotated in the direction of the arrows, seen in FIGS. 1 and 3, a force is developed along the axis of shaft 9 due to the tilt which forces film 15 to ride against a flange 16 of pressure roller 11, and flange 16 to ride against an edge of sound drum 13. This establishes a precise track for film of all widths. By adjusting the tilt of shaft 9 and pressure track 11, as indicated heretofore, optimum tracking pressure may be achieved.

The projector casing, not shown, is provided with a shaft 17 fixedly secured thereto, seen best in FIGS. 3 and 4. A frame member 18 is provided with spaced apart, outwardly extending arms 19 having openings for receiving shaft 17 upon which frame member 18 is rotatably mounted. A cylindrical sleeve 21 is fixed to shaft 17 and interposed between arms 19 of frame member 18. The sleeve 21 has an annular groove 22 and a ball bearing 23 is interposed between groove 22 and a recess in bracket 7, as seen in FIGS. 1, 3 and 4. The end portions 24, 25 or bracket 7 and frame member 18 respectively are substantially parallel and spaced apart from one another, and are provided with aligned recesses for receiving a ball bearing 26 interposed therebetween to form a pivot. The frame member 18 has a bent-up finger 27 extending through an opening 28 in bracket 7, and a compression spring 29 is interposed between a fixed flange 31 and bracket 7 with its ends encircling finger 27 and a projection 32 of flange 31.

In the operation of this invention, means are provided by the projector, not shown, for engaging an arm 33 formed by frame member 18, seen best in FIG. 4, and urging member 18 in a counterclockwise direction about shaft 17. This causes bracket 7 and pressure roller 11 to move along therewith from an operative position seen in FIGS. 1 and 3 with roller 11 in engagement with sound drum 13 to an inoperative position wherein the roller 11 is withdrawn from the periphery of sound drum 13 as for threading and the like. During this movement, ball bearing 23 rides along groove 22. When arm 33 is re-

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leased, spring 29 urges bracket 7 and frame member 18 in a clockwise direction about shaft 17 moving pressure roller 11 into engagement with the periphery of sound drum 13. The pressure roller mechanism 6 is preferably constructed so that ball bearings 23, 26 and the midpoint of the axis of roller 11 lie along a straight line A—A as seen in FIG. 3. Furthermore, for optimum tracking conditions, the line A—A is substantially perpendicular to a plane designated B—B in FIG. 3 including the axis of sound drum 13 and the midpoint of the axis of roller 11.

In the pressure roller mechanism 6 described, pressure roller 11 is capable of articulated motion in plane B—B around axis A—A. The only friction in the system acting in opposition to the articulation of roller 11 is the friction existing between ball bearings 23, 26 and the surfaces confining them. Since the lever arm at which this friction acts is equal to the radius of the ball bearing involved, it is readily apparent that the torque developed thereby would be of a small value so that pressure roller 11 is relatively free of any forces opposing articulation caused by variances in the thickness of the film on sound drum 13. The frictional force in opposition to the articulation of roller 11 could be reduced even still further by substituting a jewel bearing 34 such as seen in FIG. 5 for pivot ball bearing 26. In this case, the frictional force developed by pivot bearing 34 would be substantially zero. However, applicants have found that by reducing the size of the ball bearings 23, 26 used, it is possible to reduce the friction to a negligible value.

The invention has been described in detail with particular reference to preferred embodiments thereof, but it will be understood that variations and modifications can be effected within the spirit and scope of the invention as described hereinabove and as defined in the appended claims.

I claim:

1. In a pressure roller mechanism for pressing a web against a drum and guiding the web thereon to maintain it in a fixed position relative thereto, the combination comprising: roller means including a pressure roller carried by a bracket and movable to and from an operative position wherein said roller presses said web against said drum; support means including first and second parts having a common axis about which one of said parts is movable relative to the other part for supporting said bracket; bearing means interposed between said bracket and said support means; and resilient means for moving said roller means and said movable part relative to said other part whereby said roller means is moved into said operative position.

2. The invention according to claim 1 wherein one of said first and second parts is fixed, and the other of said first and second parts comprises a frame member rotatably mounted on said fixed part.

3. The invention according to claim 2 wherein said bearing means comprises a ball bearing interposed between said bracket and said fixed part.

4. The invention according to claim 2 wherein said fixed part comprises a shaft having a sleeve mounted thereon, and said bearing means comprises a ball bearing interposed between said sleeve and said bracket.

5. The invention according to claim 2 wherein said fixed part comprises a shaft having a sleeve mounted thereon, and said bearing means comprises a first ball bearing interposed between said sleeve and said bracket and a second ball bearing interposed between said bracket and said frame member.

6. The invention according to claim 5 wherein said sleeve is provided with a peripheral groove for receiving said first ball bearing.

7. The invention according to claim 5 wherein said second ball bearing is interposed between spaced apart end portions of said bracket and said frame member.

8. The invention according to claim 5 wherein said first and second ball bearings lie along a straight line

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passing through the midpoint of the axis of said pressure roller.

9. The invention according to claim 1 and further including a fixed flange; and said resilient means comprises a compression spring interposed between said fixed flange and said roller means.

10. The invention according to claim 1 and further including a fixed flange; and wherein one of said first and second parts of said support means is fixed, and the other of said first and second parts comprises a frame member rotatably mounted on said fixed part; said bearing means comprises a ball bearing interposed between said bracket and said fixed part; and said resilient means comprises a compression spring interposed between said fixed flange and said bracket.

11. The invention according to claim 10 wherein said frame member is provided with a projection, said bracket has an opening through which said projection extends, and one end of said compression spring encircles said projection and bears against said bracket.

12. The invention according to claim 1 and further including a fixed flange; and wherein one of said first and second parts of said support means comprises a fixed shaft, and the other of said first and second parts comprises a frame member rotatably mounted on said fixed shaft; said bearing means comprises a first ball bearing interposed between said bracket and said fixed shaft; and said resilient means comprises a compression spring interposed between said fixed flange and said bracket.

13. The invention according to claim 12 wherein a sleeve is mounted on said shaft and said first ball bearing is interposed between said sleeve and said bracket.

14. The invention according to claim 12 wherein said frame member has spaced apart flanges rotatably mounted on said shaft, and a sleeve is mounted on said shaft and interposed between said flanges.

15. The invention according to claim 14 wherein said sleeve is provided with a peripheral groove for receiving said first ball bearing.

16. The invention according to claim 1 and further including a fixed flange; and wherein one of said first and second parts of said support means comprises a fixed shaft, and the other of said first and second parts comprises a frame member having spaced apart flanges rotatably mounted on said shaft and a sleeve mounted on said shaft and interposed between said flanges; said sleeve having a peripheral groove; said bearing means comprises a first ball bearing interposed between said sleeve and said bracket and receivable by said groove, and a second ball bearing interposed between spaced apart end portions of said bracket and said frame member; and said resilient means comprises a compression spring interposed between said fixed flange and said bracket.

17. The invention according to claim 16 wherein said

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frame member is provided with a projection, and said bracket has an opening through which said projection extends, and one end of said spring encircles said projection and bears against said bracket.

18. The invention according to claim 17 wherein said first and second ball bearings lie along a straight line passing through the midpoint of the axis of said pressure roller.

19. In a pressure roller mechanism for pressing a web against a drum and guiding the web thereon to maintain it in a fixed position relative thereto, the combination comprising: roller means including a pressure roller carried by a bracket and movable to and from an operative position wherein said roller presses said web against said drum; support means including first and second parts having a common axis about which one of said parts is movable relative to the other part for supporting said roller means; and resilient means for moving said roller means and said movable part relative to said other part whereby said roller means is moved into said operative position.

20. In a pressure roller mechanism for pressing a web against a drum and guiding the web thereon to maintain it in a fixed position relative thereto, the combination comprising: roller means movable in one plane between an operative position pressing said web against the drum and an inoperative position removed from said drum, and further pivotally movable about an axis lying in said plane independently of the position of said roller means; support means for supporting said roller means; and resilient means for urging said roller means against said support means and into said operative position.

21. The invention according to claim 20 wherein bearing means is interposed between said roller means and support means.

22. The invention according to claim 21 wherein said roller means comprises a pressure roller carried by a bracket, said support means comprises a frame member rotatably mounted on a fixed part, and said bearing means comprises a first ball-bearing interposed between said fixed part and said bracket to facilitate said movement of said roller means between said operative and inoperative positions, and a second ball-bearing interposed between said bracket and said frame member to form a pivot for said roller means about said straight line.

23. The invention according to claim 22 wherein said straight line passes through said first and second ball-bearings.

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