Sept. 29, 1925. 1,555,370

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DRIVING MECHANISM FOR MOTION PICTURE MACHINES

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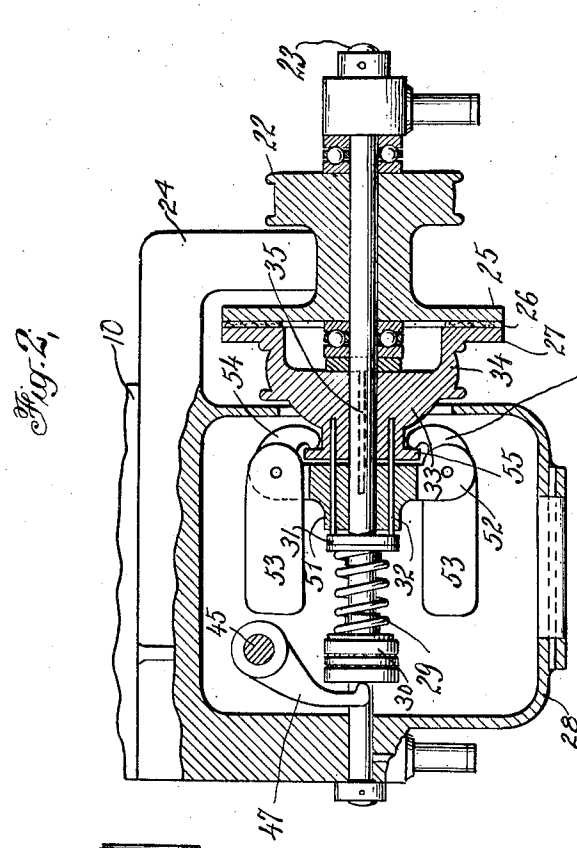


Fig. 2.

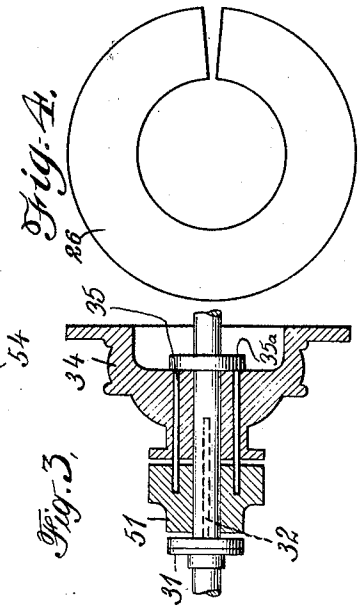


Fig. 4.

Fig. 3.

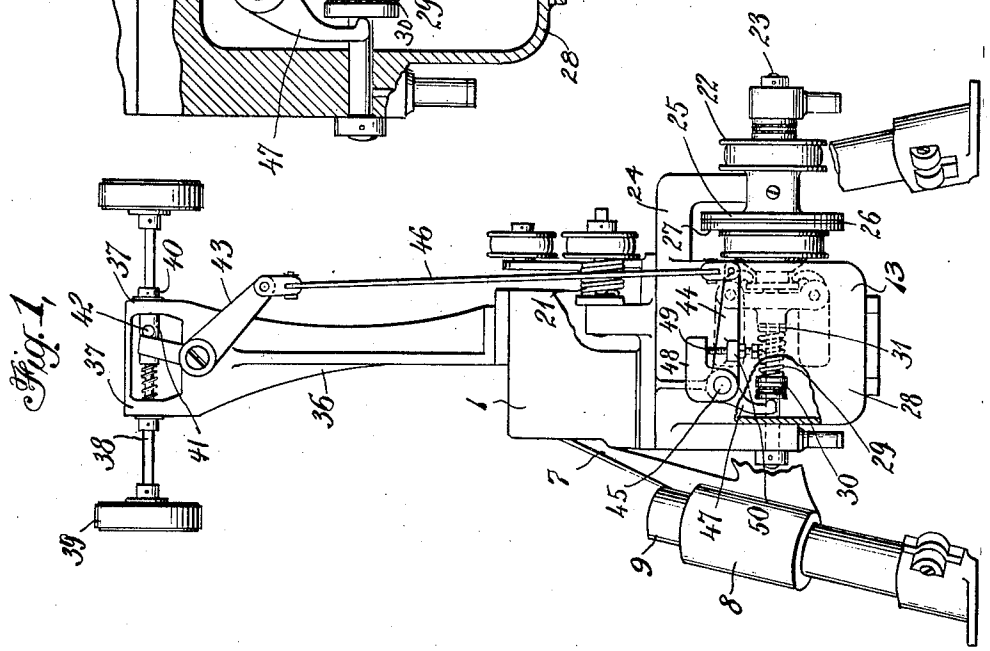


Fig. 1.

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UNITED STATES PATENT OFFICE.

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DRIVING MECHANISM FOR MOTION-PICTURE MACHINES.

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To all whom it may concern:

Be it known that I, HENRY F. HEIDEGGER, a citizen of the United States, residing at 223 Smith Street, Brooklyn, in the county of Kings, State of New York, have invented certain new and useful Improvements in Driving Mechanism for Motion-Picture Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The present invention relates to driving mechanism for use in apparatus for the projection of motion pictures, and relates particularly to a flexible driving connection between the motor and the driven mechanism of the apparatus.

It is desirable for the satisfactory projection of motion pictures that the film and shutter driving mechanism, commonly driven from an electric motor, be operated at substantially constant speed under all conditions. Variations in the speed of the motor are inevitable, however, due to sudden differences in load caused by sticking of the film, etc. and to external causes beyond the control of the operator, such as changes in the voltage impressed on the driving motor.

It is accordingly a principal object of the present invention to provide in a motion picture machine a flexible driving connection between the motor and the driven mechanism of the apparatus to effect the operation of this mechanism at substantially constant speed at all times regardless of variations in speed of the driving motor.

It is also an object of the invention to provide a device of this type which is entirely automatic in its operation of regulating for a constant speed, and which is provided additionally with a manual adjustment to determine the particular speed which is to be maintained.

It is a still further object to provide a device of this type consisting of a relatively small number of elements and of simple construction, the driving connection being established by means of a friction disc having a replaceable contact surface.

I have illustrated a preferred embodiment of my invention in the accompanying drawings, in which Figure 1 is an elevational view showing a motion picture projector embodying my invention; Fig. 2 is a sectional view showing the clutch mechanism of the apparatus; Fig. 3 is a partial sectional view showing a portion of the mechanism, taken at right angles to the section shown in Fig. 2; and Figure 4 is a detail view showing the construction of a portion of the mechanism.

Referring to the drawings, particularly to Figure 1, 1 indicates the main frame of the projector which may be cast as a unit. The frame 1 is supported at each corner by an inclined leg bracket 7 which is securely bolted to the frame 1 at its upper end and is provided at its lower end with a socket 8 for receiving the supporting legs 9 of the apparatus and permitting individual adjustment of each leg. The leg brackets 7 and legs 9 are preferably inclined outwardly as shown for the purpose of providing a large base area so that the individual adjustment of any leg will not materially shift the center of the apparatus.

Beneath the frame 1 is mounted the driving motor and the friction clutch mechanism indicated at 13 in Figure 1 and shown in detail in Figures 1 and 2. Power from the motor is transmitted to the clutch mechanism 13 through a suitable belt. The mechanism of the apparatus is operated through a belt driven through the clutch mechanism 13.

Referring to Figs. 1 and 2, the driving belt of the machine works over a pulley 22 rotatably mounted upon the through shaft 23 of the clutch mechanism, the ends of the shaft being fixedly supported in a bracket 24 depending from a suitable hanger. The friction disc 25 of the clutch is formed integrally with the pulley 22, or otherwise rigidly attached thereto, and rotates in fixed relation to the pulley. A facing 26 of suitable material, such as, for instance, composition board or leather is preferably fitted to the inner side of the disc 25 to provide a contact surface between the clutch members. This facing 26 may be provided on the cooperating friction disc 27 instead of on the disc 25, or a thin facing may be given each of the discs if desired. I prefer, however, to provide only one of the friction discs with a facing of fiber or similar material inasmuch as satisfactory results are obtained in this manner and there is less likelihood of wearing or tearing such as might occur if both discs were so faced. I also preferably provide the facing member with a radial slot as

shown in Figure 4 so that, in case the contacting faces become covered with oil or otherwise get into such condition that upon an attempt to separate them a region of partial vacuum is created between them, the discs may nevertheless be moved apart without undue effort.

The inner portion of the shaft 23 is enclosed within a housing 28 and carries a coil spring 29 bearing at its respective ends against the ball race 30 and a member or collar 31. A plurality of rods 32 are attached with uniform spacing around the member 31 near its outer edge which rods extend completely through the member 51 into sockets formed in the body portion 33 which carries the driven friction disc 27. Two such rods are provided in the embodiment shown. The body portion 33 is also shaped to form a pulley 34 over which the driving belt operates and imparts rotation to the mechanism of the apparatus whenever disc 27 is rotated. This body portion is free to rotate relative to the shaft 23 but is held in fixed rotative relation with the intermediate member 51 by reason of the rods 32 and also the rods which extend from a supporting collar 35ª through the body portion 33 and into corresponding sockets in member 51. If the coil spring 29 is placed under compression, this compression will react against the member 31 and by means of the rods 32 will press the driven friction disc 27 into operative relation with the disc 25.

For accomplishing the engaging and disengaging of the friction discs there is provided an actuating mechanism supported on an extension 36 bolted to the frame of the apparatus. The upper end of the extension 36 is widened out to form a pair of walls 37 in which is rotatably mounted a shaft 38 provided at each end with a hand wheel 39 and threaded along the central portion of its length. The threaded portion lies between the walls 37 and the shaft is restrained from longitudinal movement by means of collars 40 rigidly secured to the shaft and bearing against the outer faces of the walls 37. A member 41 is threaded over the shaft between the walls 37 and is restrained from rotation so that by rotating the shaft 38 the member 41 may be made to move longitudinally of the shaft over the entire distance between the walls. The movement of the member 41 is utilized through the medium of a bell crank lever 43.

The movement of the bell crank lever 43 is utilized in bringing the friction discs into engagement by means of a lever 44 supported at one end by the shaft 45 of the clutch shifting mechanism and attached at its other end to the lower extremity of a connecting rod 46 whose upper end is secured to the free arm of the bell crank lever 43.

At that end of the shaft 45 which is within the housing 28 there is rigidly attached a block 47 which engages with the ball race 30 on the shaft 23 and moves it longitudinally of its shaft whenever shaft 45 is rotated. The lever arm 44 may be rigidly connected to the shaft 45 in which case operation of the adjusting mechanism which causes the outer end of the lever to be raised or lowered, will effect a corresponding rotation of the shaft 45 and a consequent compression or elongation of the spring 29, due to the movement of the ball race 30 along its shaft. For the purpose of giving a wider range of adjustment, however, the lever 44 is preferably left free to rotate about the shaft 45 and an additional member 48 is secured rigidly to the shaft and is engaged by a set screw 49 threaded in a boss 50 cast on the side of the lever 44. Thus if the outer end of the lever 44 is lifted, the set screw 49 will engage with the member 48 and cause shaft 45 to rotate, moving the friction discs into engagement. Adjustment of the set screw, however, permits movement of the lever about its shaft. This, together with the adjustment afforded by the bell crank lever 43, gives a wide range of adjustment and spring 29 may be compressed to any desired degree to suit conditions of operation.

To attain substantially constant speed of the driven elements an automatic regulating device is provided to vary the driving connection established between the friction discs as the speed of the driving disc changes. The member 51 is fitted over the shaft 23 and assembled between the member 31 and the member 33, the rods 32 passing longitudinally through it. Member 51 is free to rotate about the shaft, but is held by the rods 32 and 35 in fixed rotative relation with the body portion 33, the rods 35 being two in number passing through the member 33 at diametrically opposite points The longitudinal movement of the member 51 relative to the body 33 is limited by rods 35 contacting with the bottoms of their sockets. Spaced equally around the periphery of the member 51 and projecting radially outwardly is a plurality of brackets or extensions 52 in each of which is pivoted a metal block 53, the pivots being nearer one end of the block than the other. Under the influence of rotation the blocks 53 will tend to spread outwardly and will consequently move about their pivots. The shorter ends of these blocks are provided with inwardly extending fingers 54, which when the heavy ends of the blocks are swung outwardly, engage behind the flange 55 formed at the inner end of the body member 33 and tend to move the body member longitudinally of the shaft, thus decreasing the pressure between the friction discs 25 and 27.

In adjusting the apparatus the compression of the coil spring 29 will be regulated through the hand wheels 39 or set screw 49 such that the proper speed will automatically be maintained. If the spring is subjected to a high compression the speed at which the centrifugally operated blocks 53 will affect the driving engagement between the friction discs will be correspondingly high. By properly adjusting the compression of the spring the members 53 may be made to decrease the pressure exerted between the friction discs at any speed desired. Such adjustment may conveniently be made while the apparatus is in operation by merely turning one or the other of the hand wheels 39, two of these wheels being provided so that the adjustment may be made with equal facility from either side of the machine.

I have found that an apparatus equipped with my improvement will regulate for substantially constant speed regardles of variations in speed of the driving motor. If the driving motor speeds up the members 53 will move outwardly and slightly decrease the pressure exerted between the friction discs, thus allowing a slight amount of slip between them and yet not completely disrupting the driving engagement or moving any of the elements through an appreciable distance. When the speed of the driven member begins to decrease slightly the members 53 will press against the flange 55 with less force and allow the spring to force the friction discs more securely into driving engagement.

While I have illustrated and described preferred embodiments of my invention, it is understood that the details of construction may be varied within the full scope of the appended claims.

I claim:

1. Driving mechanism for motion picture projectors comprising a friction driving disc, a cooperating disc driven therefrom and movable longitudinally relative to said driving disc, means rotatable with said driven disc for normally pressing the engaging faces of said discs together, centrifugally actuated means for regulating the pressure between said discs, a carrier for said centrifugally actuated means and said pressing means movable longitudinally with respect to both the driving disc and the driven disc and means for limiting the longitudinal movement of said carrier without restricting the free longitudinal movement of said driven disc.

2. Driving mechanism for motion picture projectors comprising a friction driving disc, a cooperating disc driven therefrom and movable longitudinally relative to said driving disc, means rotatable with said driven disc for normally pressing the engaging faces of said discs together, a shaft carrying both the driving disc and the driven disc, centrifugally actuated means carried by said shaft and rotatable and slidable thereon for varying the pressure between said discs upon variations in the rotative speed of said driven disc, said means comprising a plurality of actuating members and a carrier for said actuating members, fixed rotatively with respect to said driven disc and spacing rods associated with said carrying member and traversing said driven disc without attachment thereto for determining the longitudinal spacing of said carrying member and said driven disc.

3. Driving mechanism for motion picture projectors comprising a shaft fixedly mounted in the frame of the projector, cooperating friction driving and driven members mounted for independent rotation and independent relative slidable movement upon said shaft, centrifugally actuated means for varying the pressure between said discs upon variations in the rotative speed of said driven disc, comprising a plurality of actuating members mounted for independent rotatable and slidable movement on said shaft, a spring for normally pressing the engaging faces of said discs together, rods traversing said carrier and engaging said driven disc for transmitting the pressure of said spring to the driven member and maintaining said carrier and said driven disk in fixed rotative relation, but permitting relative slidable movement between said parts and rods traversing said driven disc and engaging said carrier for limiting the longitudinal movement of said carrier, but permitting relative longitudinal movement of the carrier, the driven disc and the driving disc.

In testimony whereof I affix my signature.

HENRY F. HEIDEGGER.