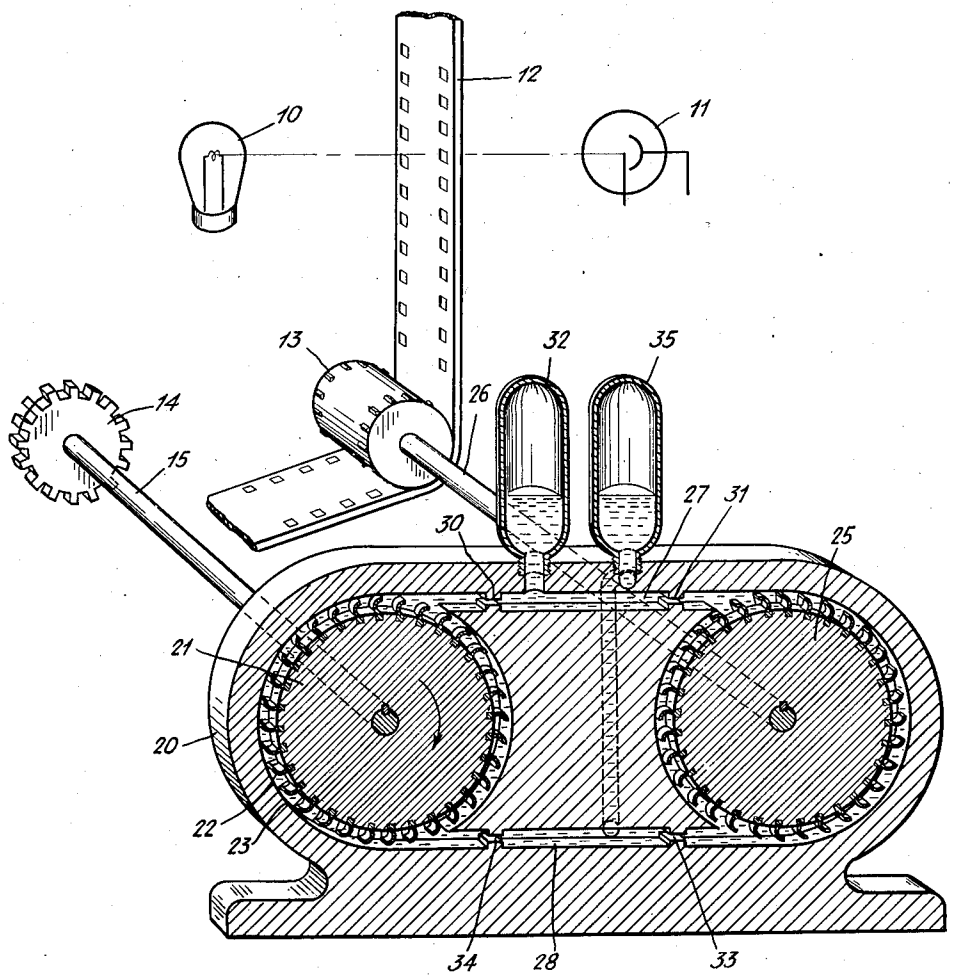
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FILM DRIVE MECHANISM

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FILM DRIVE MECHANISM

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The present invention relates to constant speed film driving apparatus, and pertains generally to apparatus for supplying a uniform continuous rotary motion to a rotating member from a driving member having a continuous rotary motion subject to minor irregularities.

One object of the invention is to provide a constant speed mechanism which is of very light weight.

Another object of the invention is to provide such a mechanism which is extremely compact.

Another object of the invention is to provide such a mechanism which has a minimum number of moving parts.

Another object of my invention is to provide means for drawing a photophonographic film record or the like past a recording or reproducing point at a very uniform speed.

Other objects of my invention will be apparent to those skilled in the art from an inspection of the accompanying drawing and a reading of the following specification.

The figure of the drawing is a more or less diagrammatic illustration of my drive mechanism in section and illustrates the manner of its application to a sound film record.

In the application of the invention illustrated, I have indicated the sound reproduction point by the center line connecting the exciter lamp 10 and the photocell 11 and passing through the film 12. It will be understood that at this sound takeoff point, any usual form of optical system for analyzing the sound record would be provided, and the photocell would be provided with the usual amplifiers etc., the present illustration serving merely to indicate the location of such apparatus.

The film 12 is drawn past the reproduction point by the sprocket 13 which must be driven at a constant speed in order to secure proper sound reproduction.

The source of power for driving the sprocket 13 is indicated as a gear 14, the gear may be driven by any prime mover, or a prime mover may itself be attached to the shaft 15 in place of the gear 14. The present illustration serves merely to indicate the immediate origin of the power.

As is well known, there are minor irregularities in the power transmitted by a gear train even though the source of power itself be perfectly uniform. There are also minor irregularities in the movement of practically all prime movers, and it is the purpose of the present invention to smooth out, in so far as is practicable, these irregularities of movement between the gear 14 and the sprocket 13. This result is accomplished by the mechanism shown in the foreground of the drawing. A casing 20 is provided (shown cut away), and this casing may be of any appropriate non-porous material, e. g., aluminum, phenolic resin, or cast iron.

To the shaft 15 is attached a rotary pump member 21 having appropriate buckets or vanes 22. This pump may be either of the centrifugal type or of the pressure type. In the present instance, I have indicated a pump of the pressure type as it is more efficient at low speeds than a pump of the centrifugal type. The buckets 22 fit closely into the circular recess 23 in the casing 20, and this entire recess, as well as the communicating passages, is filled with fluid. For reasons hereinafter pointed out, this fluid is preferably one of a viscous nature, as, for example, a light lubricating oil. It will be apparent that when the pump member is rotated by the shaft 15 in the direction of the arrow, it will cause the fluid to move with the vanes, drawing fluid in at the bottom of the member 21 and ejecting it at the top.

A second similar member 25 is provided connected to the shaft 26 of the sprocket 13, and this member 25 serves as a hydraulic motor for driving the said sprocket 13.

The pump 21 and the motor 25 are connected by passageways 27 and 28, and these passageways are so constructed as to filter out any irregularities imparted to the fluid driving medium by the pump 21. The passage 27 is provided with two restricted portions 30 and 31, and between these restricted portions there is connected with the passage 27 an appropriate air chamber 32. It will be apparent that this element 32 need not be the ordinary type of air chamber as shown, but may be any usual hydraulic capacity as, for example, a spring diaphragm, a spring pressed plunger, or any other usual device used for absorbing pressure waves in a hydraulic system.

The constringence 30 tends to cause the fluid from the pump 21 to be emitted into the passageway 27 at a constant pressure and/or velocity. The constringence 31 likewise tends to cause the fluid to be ejected from the passageway 27 at a constant pressure and/or velocity. Any sudden irregularity in the pressure of the fluid in the passageway 27 caused by a sudden irregularity in the movement of the shaft 15 will meet with resistance in change of velocity at the constringence 31, and the corresponding change of pressure produced in the passageway 27 will be

absorbed by the member 32. It should be noted that this action is the same, except in direction, whether the change of pressure be negative or positive.

Between the motor 25 and the pump 21 on the return side of the system, I provide corresponding constringences or restrictions 33 and 34 which function in the same manner as the constringences 30 and 31; and to the passageway 28 I connect a second pressure chamber 35. This second pressure chamber is not absolutely necessary but is desirable as it improves the performance of the apparatus. The circuit including the constringences 33 and 34 and the capacitance 35 functions, of course, in the same manner as the above-described assemblage 30, 31, 32 and 27.

It will be apparent from the foregoing description that between the driving member 21 and the motor 25 I have interposed a hydraulic circuit which resists any tendency to change velocity pressure and which, in addition to such resistance, has provision for absorbing any such change in velocity or pressure. The motor 25 with the connected shaft 26 and sprocket 13 will therefore be driven at a much more constant velocity than the shaft 15.

I prefer to use a viscous fluid, such as light machine oil, rather than a fluid of very low viscosity such as water for the reason that the resistance effect thereupon at the constringences referred to varies more rapidly with change in pressure than is the case with a fluid of low viscosity. Also, the higher the viscosity of the fluid used, the greater the pressure difference is between the constringences 30 and 31 and between the constringences 33 and 34, and therefore the more effective the filtering action is. If the viscosity of the fluid becomes too high, however, it decreases the efficiency of both the pump 21 and the motor 25, and it is therefore necessary to choose a fluid which provides the most satisfactory balance between efficiency and filtering action for the particular apparatus in which it is to be used.

Having thus described my invention, I claim:

1. A film drive mechanism comprising a rotary pump, a hydraulic motor, fluid connecting said pump and said motor, means co-operating with said connecting fluid and resisting any change in velocity thereof, and hydraulic capacity means for absorbing any change in pressure thereof.

2. A sprocket drive mechanism including a fluid body moved at a speed which tends to vary, flow restricting means interposed in the path of said moving fluid, and pressure absorbing hydraulic capacity means associated with said path.

3. A film drive mechanism including a fluid body, means for producing movement of said body, and flow resisting and pressure responsive hydraulic capacity means for regulating said movement.

4. A film drive mechanism including a fluid body, means for producing movement of said body, flow restricting and pressure responsive hydraulic capacity means for regulating said movement, and means for transmitting said regulated movement to said film.

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