O. P. M. DAVIS.

POWER TRANSMITTING MECHANISM.

APPLICATION FILED MAY 7, 1908.

959,119. Patented May 24, 1910.

Fig. 1.

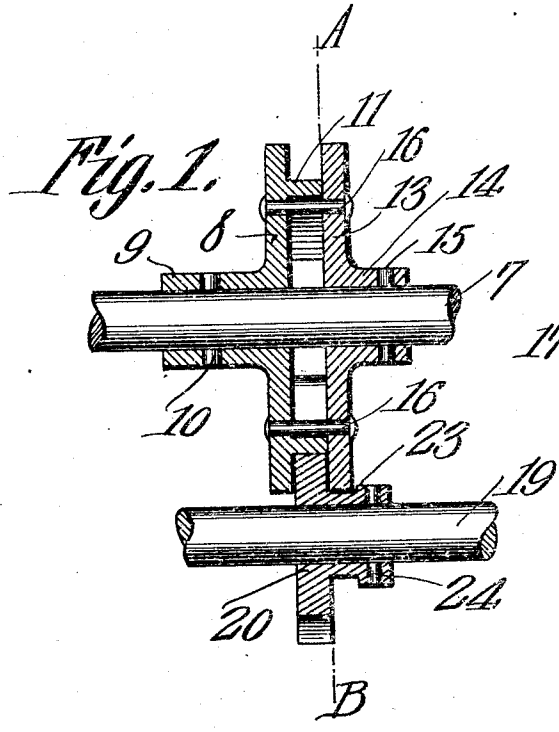

Fig. 2.

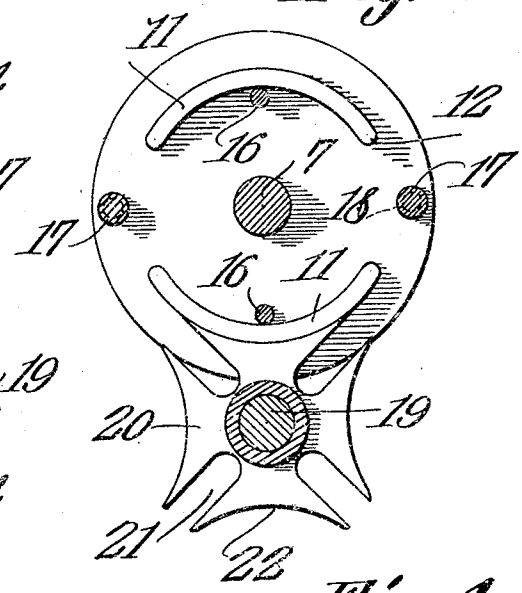

Fig. 3.

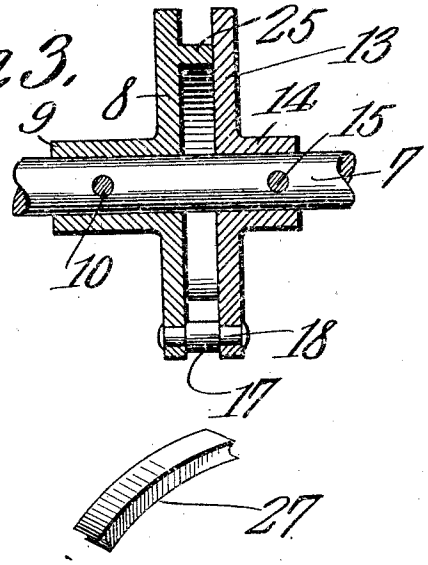

Fig. 4.

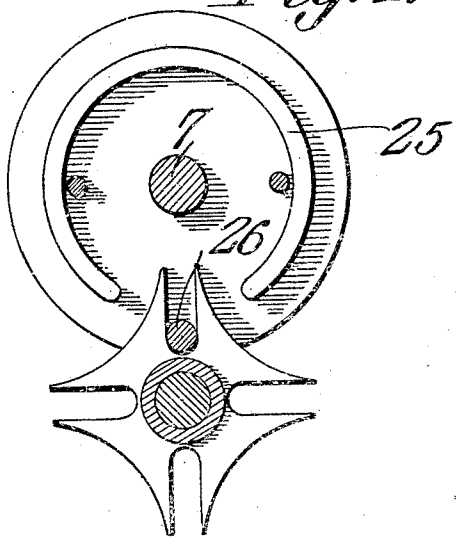

Fig. 5.

Witnesses

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POWER-TRANSMITTING MECHANISM.

959,119. Specification of Letters Patent. Patented May 24, 1910.

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To all whom it may concern:

Be it known that I, OLIVER P. M. DAVIS, a citizen of the United States, residing at Bedford, in the county of Lawrence and State of Indiana, have invented a new and useful Power-Transmitting Mechanism, of which the following is a specification.

This invention has reference to power transmitting mechanism particularly adapted to motion picture machines and is directed more particularly to the mechanism for the step by step advancement of the film.

In motion picture machines of the type of the Edison kinetoscope or the Powers camerograph and machines of like construction and operation the film is intermittently fed forward by a gearing composed of a pin wheel and a star or Geneva wheel. The pin wheel is constantly rotated and by means of one or more projecting pins so that an intermittent step by step rotation is imparted to the star wheel, and the said star wheel is mounted on a shaft carrying a toothed drum engaging the film and so imparting to the said film a forward movement corresponding to the step by step rotation of the star wheel. The constantly rotating pin wheel is composed of a disk from one face of which there projects one or more segmental flanges arranged concentric with the axis of rotation of said disk. If one segment be used it is in the form of an annulus with a small section removed so as to constitute in fact a mutilated annular flange projecting from one face of the disk and concentric with the axis thereof. If two segments be used then these two segments are arranged on opposite sides of the axis of the disk with their edges equi-distant one from the other, and the two segments are arranged equi-distantly from the axis of the pin wheel. If but one segment or flange be used on a disk then the disk is provided with a single laterally projecting pin, at a point midway between the contiguous ends of the flange or segment but located at a greater distance from the axis of the disk than is the outer periphery of the segment. If two segments be used two pins are provided located midway between the contiguous ends of the segments but at a greater distance from the axis of the disk than is the outer surface of the said segments. The disk is carried on a shaft through which motion is imparted to the disk, and power is applied to the shaft through any suitable gearing common to machines of this character. The star or Geneva wheel has four radial slots opening at the periphery, and between these slots the periphery is reversely curved on the same radius as the outer edge of the segment or segments of the pin wheel. The star wheel is mounted upon a shaft parallel with the shaft carrying the pin disks and the parts are so related that the reversely curved periphery of the star wheel will lie against the outer face of the segment or segments on the pin wheel or disks. When the pin disk is rotated then the pin or pins thereon will enter the slots in the star wheel and by the coaction of the pins and segments on the pin wheel the star wheel is caused to rotate through an arc of 90°, each time one of the pins on the pin wheel engages in a slot on the star wheel. In this way the continuous rotation of the pin wheel imparts to the star wheel an intermittent step by step rotation. The shaft of the star wheel carries suitable mechanism for imparting to the films a forward motion as desired.

As far as the intermittent feed of the film is concerned the structure just described answers the purpose, but in practice it has developed some defects which it is the purpose of the present invention to overcome. One of the defects is that the pin will work loose and jam or even destroy the star wheel, or if the pin should loosen sufficiently to fall out then the machine will fail to operate. Moreover there is a lack of steadiness in the operation of feeding mechanism which becomes obtrusive when the pictures are projected on the screen.

By the present invention the objectionable features which have been noted are entirely overcome so that the structure works with certainty and without the unsteadiness of machines formerly constructed.

By the present invention the star wheel works between two disks firmly secured together and separated by the flange or segment while the pins actuating the star wheels are supported at each end in the two disks flanking the star wheel. By this means the pins are prevented from loosening or dropping out and the star wheel is so supported that all side motion is prevented and great steadiness is imparted to the picture projected on the screen.

The invention will be best understood from a consideration of the following detailed description taken in connection with

the accompanying drawings forming a part of this specification, in which drawings:

Figure 1 is a longitudinal section of the pin and star wheels taken on the plane of the axis of the shafts supporting these two wheels. Fig. 2 is a section of a line A—B of Fig. 1. Fig. 3 is a section of a modified form of pin wheel, the section being similar to that of Fig. 1. Fig. 4 is a section similar to that of Fig. 2, but showing the pin wheel of Fig. 3, and Fig. 5 is a detail view of a spacing block which may be used in connection with known forms of pin wheels.

Referring to the drawings there is shown a shaft 7 which may be considered as part of the mechanism of the step by step power transmitting devices of a motion picture machine. The shaft 7 near one end carries a disk 8 provided with a hub 9 through which a pin 10 is passed to secure the disk firmly to the shaft 7. On the face of the disk remote from the hub 9 there are formed two diametrically opposed segmental flanges 11 equidistantly spaced from the axis of the shaft 7, as shown best in Fig. 2. These flanges have their contiguous edges spaced apart and rounded also as shown in Fig. 2. The flanges 11 are also spaced inward a distance from the periphery of the disk 8. On the shaft 7 is another disk 13 having a hub 14 for the passage of a pin 15 by means of which the disk is secured to the shaft 7. The face of the disk 13 remote from the hub 14 abuts against the flanges 11 and these flanges 11 serve to space the disks 8 and 13 apart. The disks 8 and 13 are also secured together by rivets or pins 16 lying in a diametric plane cutting the disks about midway of the length of the flanges 11, and these pins or rivets extend through the disks at points immediately inside of the said flanges 11. The two disks 8 and 13 carry other pins 17 midway between the contiguous ends of the flanges 11, but located nearer the periphery of the disks than are the said flanges 11. The pins 17 have reduced ends 18 extending through the disks 8 and 13 and are there riveted or otherwise secured. Spaced a short distance from and parallel with the shaft 7, is another shaft 19 upon which is mounted a star wheel 20, having equi-distant radial slots 21 opening at the periphery of the wheel and the portion of the periphery between the slots is reversely curved as indicated at 22, the curvature being on the same radius as that of the flanges 11. The star wheel has a hub on one side in which is formed an annular groove, and through this hub is passed a pin 24 for securing the star wheel firmly to the shaft 19. The reversely curved portions 22 of the star wheel engage the outer edge of the flanges 11, and the pins 17 are so located that when the disks 8 and 13 are rotated these pins will successively enter the slots 21 to substantially the inner end thereof and turn the star wheel through a quarter revolution, the projecting portions of the star wheel entering the spaces between the contiguous ends of the flanges 11. The disks 8 and 13 practically house in turn each star wheel member when between them, the periphery of the disk 13 entering the annular groove 23 in the hub of the star wheel thus contributing to the steadiness of running of the parts.

In the structure shown in Fig. 2 the star wheel is given two impulses of rotation to each revolution of the shaft 7. In the structure shown in Fig. 4 but one movement of rotation of the star wheel is given for each complete rotation of the shaft 7. This operation is due in the structure in Fig. 4, to the fact that there is provided but one flange 25 of annular form with a single cut-away portion, in operative relation to which cut-away portion there is provided a pin 26 like the pins 17 of the structure of Fig. 2. The structure of Fig. 2, may be readily made to operate like the structure of Fig. 4 by the use of a filling-in piece 27 shown in Fig. 5 to be located between the contiguous ends of the flanges 10. When the filling-in piece 27 is used in the structure of Fig. 2, then the corresponding pin 17 is omitted, and in such case the cam disk becomes a one pin disk like the structure of Fig. 4.

In motion picture machines employing the pin and star wheel type of feed for the film, the disk 13 is not present but the disk 8 with the segmental flanges 9 and pins 17 is employed. These pins are therefore supported at one end only and in practice often work loose and sometimes fall entirely off from the disks.

In the operation of the motion picture machine the pins 17 are subjected to constant and rapid shocks, numbering many every second, and the continual jars or blows to which the pins are subjected ultimately work these pins loose in their seats so that even when initially firm they ultimately work loose and jam the star wheel or otherwise cause injury to the mechanism. This difficulty is avoided by the present invention wherein the pins are supported at each end and so cannot by any possibility work loose in their supports. The difficulty and danger to the machine heretofore arising from loose or lost pins is entirely avoided by the present invention, for the pins 17 even if they work loose in the disks, 8 and 13, cannot become dislodged therefrom nor displaced sufficiently to endanger the star wheel or to prevent its proper operation. Another difficulty that has arisen in the use of star wheel actuating mechanism such as has heretofore been used lies in the fact that the star wheels are not prevented from side movement and the side movement that therefore occurs in the normal operation of

the machine is imparted to the film. This side movement though it be very small at the star wheel, is greatly magnified in the picture thrown upon the screen, and then becomes very apparent and obtrusive. This last named difficulty is entirely avoided by the present invention since the star wheel is supported on each side and therefore can have no appreciable side movement in operation. Those portions of the disks 8 and 13 which extend beyond the flanges 11 constitute the side walls of a channel, with the flanges 11 constituting the bottom walls thereof. The wings of the star wheel travel in this channel and in practice the fit of the disks 8 and 13 to the sides of the star wheel is sufficiently snug to prevent all obtrusive side movement of the film even under the great magnification of the picture on the screen, and consequently the display on the screen is materially steadier than is the case with motion picture machines as heretofore constructed.

The invention has been described with reference to motion picture projection apparatus, but it is evident that it can be used with equal facility in motion picture cameras.

While in motion picture cameras the want of steadiness due to the side motion of the star wheel is not particularly obtrusive, there is the same probability of the pins 17 working loose or becoming lost and so interfering with the operation of the machine.

It is to be understood that the rivets or pins 16 may be replaced by screws if so desired.

The groove in the pin wheel into which the star wheel enters serves to retain lubricating oil and therefore will not get dry as happens with the pin wheel now in use.

What is claimed is—

1. In a machine of the character described, means for producing a progressive step by step movement without lateral or side play comprising a star wheel having a hub formed with an annular groove, and a pin wheel, the latter being formed of two spaced disks between which the star wheel enters for substantially the distance between its periphery and hub, one of the disks engaging in the groove in the hub of the star wheel.

2. In a machine of the character described, means for producing a progressive step by step movement, without lateral or side play, comprising a pin wheel formed of two plane spaced disks secured together for common action and one of the disks having a laterally projecting portion extending to the other disk, and a star wheel provided with a hub having a circumferential groove, said star wheel entering between the disks which latter closely embrace the star wheel up to the hub thereof, with one of the disks entering the groove in the said hub.

3. In a machine of the character described, means for producing a step by step progressive movement without lateral or side play comprising star and pin wheels with the pin wheel formed of a plane disk with a mutilated annular flange structure on one face and another plane disk secured to the first disk and spaced therefrom by the flange structure, said disks together being provided with pins forming engaging means for the star wheel, which pins are supported at both ends in the two disks, and other pins connecting the disks out of the path of the star wheel, and the star wheel having a hub with a circumferential groove entered by one of the disks of the pin wheel.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

OLIVER P. M. DAVIS.

Witnesses:
JOHN H. UNDERWOOD,
JOHN C. MCKINNEY.