C. C. SPINKS.

VARIABLE SPEED GEARING.

APPLICATION FILED JULY 2, 1910.

1,006,017.

Patented Oct. 17, 1911.

2 SHEETS—SHEET 1.

Fig. 2.

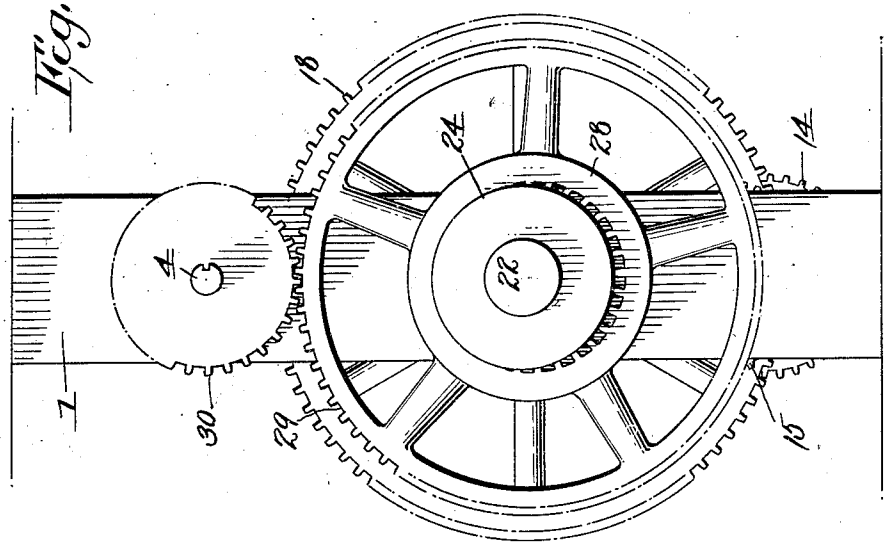
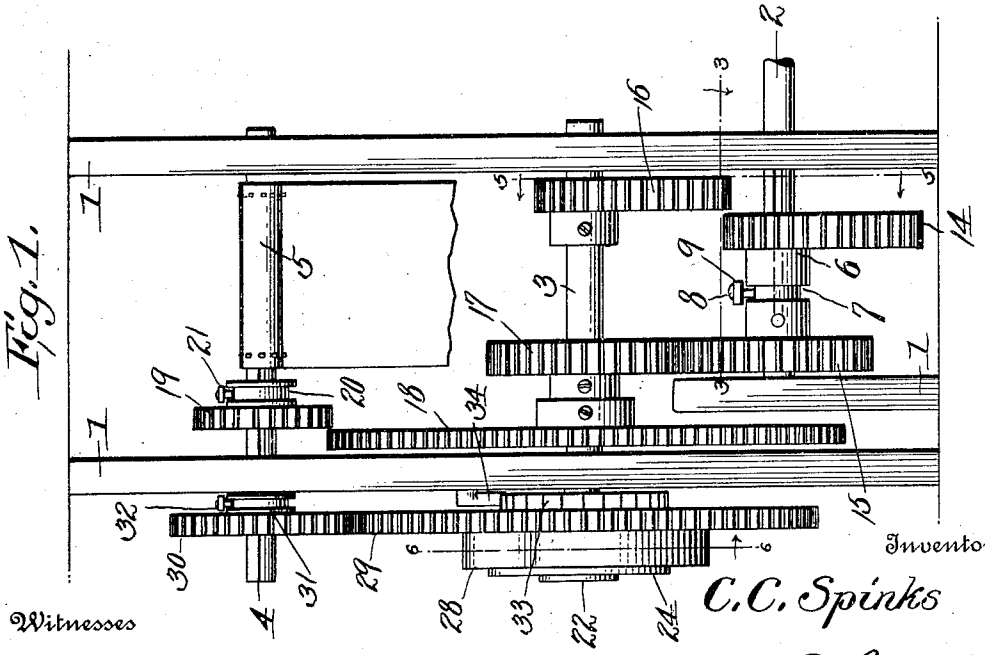


Fig. 1.



Witnesses

Alvin N. Holmes

E. B. McBath

Inventor

C. C. Spinks

By Chas. E. Brock

Attorney

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2 SHEETS—SHEET 2.

Fig. 3.

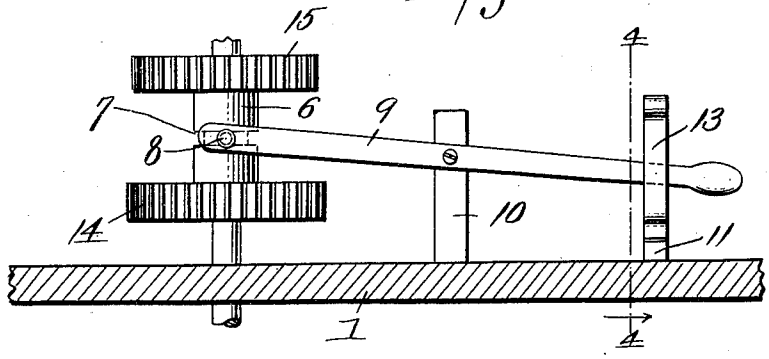


Fig. 4.

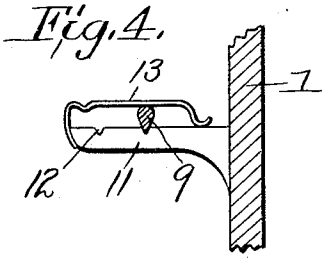


Fig. 5.

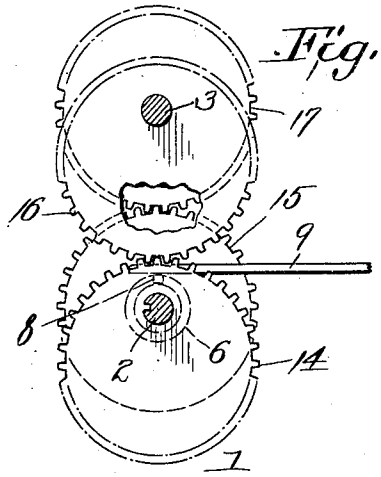


Fig. 6.

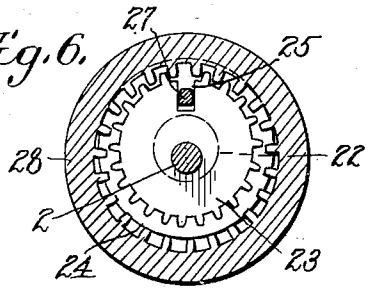


Fig. 7.

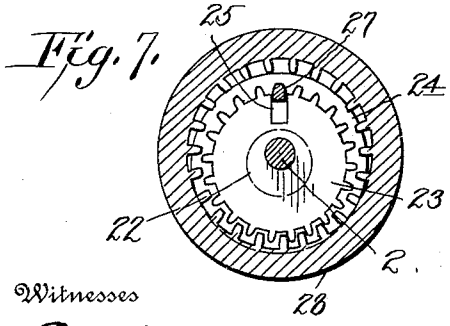
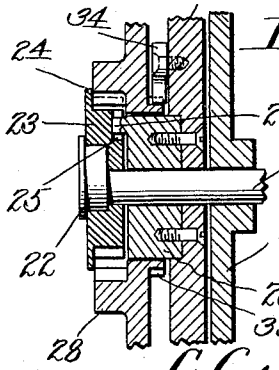


Fig. 8.



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Inventor

C. C. Spinks,

By Chas. E. Brock

Attorney

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

CHARLES C. SPINKS, OF WASHINGTON, DISTRICT OF COLUMBIA, ASSIGNOR TO M. C. SPINKS AND M. A. POOR, OF MEMPHIS, MISSOURI.

VARIABLE-SPEED GEARING.

1,006,017. Specification of Letters Patent. **Patented Oct. 17, 1911.**

Application filed July 2, 1910. Serial No. 570,100.

To all whom it may concern:

Be it known that I, CHARLES C. SPINKS, a citizen of the United States, and a resident of the District of Columbia, have invented a new and useful Improvement in Variable-Speed Gearing, of which the following is a specification.

This invention relates to a variable speed gearing for feeding films either in cameras or in devices for projecting moving pictures.

The invention relates more particularly to kinematograph cameras and projectors.

The object of the invention is to permit the running of the film at a number of different speeds, thereby making it possible to do any and all kinds of work with the machine, and a further object of the invention is to obtain a practically noiseless feed.

A still further object of the invention is to secure the various speeds by means of the same drive shaft, and without changing the speed of rotation of the said shaft, or of the crank handle, when the machine is hand operated.

The speed gearing shown herein is also adapted for use, and is intended to be used in combination with the shutter shown in the application executed and filed by me June 30, 1910 Serial Number 569,824.

The invention consists of the novel features of construction hereinafter described, and pointed out in the claims and shown in the accompanying drawings in which:

Figure 1 is a side elevation of the gearing. Fig. 2 is an end view. Fig. 3 is a horizontal section on the line 3—3 of Fig. 1. Fig. 4 is a detail view illustrating a locking device for a shifting lever. Fig. 5 is a section on the line 5—5 of Fig. 1. Fig. 6 is a section on the line 6—6 of Fig. 1. Fig. 7 is a section upon the same line as Fig. 6, parts being shown in opposite position. Fig. 8 is a transverse section taken through the parts shown in Fig. 6 and at right angles thereto.

In constructing the device I employed a suitable frame work 1 in which I journaled a drive shaft 2, a driven shaft 3, and a film carrying shaft 4. Upon the last mentioned shaft is mounted the usual drum 5. A slidable hub is provided with a groove 7 engaged by a pin 8 carried by a lever 9. The lever 9 swings in a horizontal plane, being pivotally mounted upon an extension 10 carried by the frame 1. The handle portion of the lever works over a bracket 11 which is provided with notches 12 to receive the lever, and the lever is held in position by means of a spring 13, as shown in Figs. 3 and 4. At one end the hub 6 carries an eccentrically mounted gear 14, and at the opposite end a concentrically mounted gear 15. These gears may or may not be of the same size. Mounted upon the shaft 3 is an eccentrically mounted gear 16 of the same size as the gear 14 and adapted to mesh with it. Also fixed upon the shaft 3 is a gear 17 adapted to mesh with the gear 15. The hub 6 is of such length that when the gear 15 meshes with the gear 17 the gear 14 is out of engagement with the gear 16. A large gear 18 is also fixed upon the shaft 3, and upon the shaft 4 is slidably keyed a small gear 19 adapted to mesh with the gear 18. The gear 19 is provided with a grooved collar 20 operated by a lever 21 substantially similar in construction to the lever 9.

One end of the shaft 3 is provided with an eccentric head 22, slightly flanged and upon said head is loosely mounted a small non-rotating gear 23, provided with a flange 24, the flange being of slightly greater diameter than the gear proper. This gear is provided with a radial slot, or recess 25, which does not extend into or through the flange, and fixed to the frame work 1 is a collar 26 which carries a laterally projecting pin 27 which projects into the recess 25. As the collar is fixed to the frame work and as the pin always rests loosely in the recess rotation of the gear 23 is of course impossible. This gear is mounted within an internal gear 28 and as shown by Figs. 6 and 7 has sufficient play within the internal gear to permit a slight reciprocal movement of the gear 23 without at any time actually becoming disengaged from the internal gear. This movement is due to the eccentric head 22 and to the pin 27, the latter serving as a guide. The gear 23 has two teeth less than the internal gear 28. The gear 28 is integral with a large gear 29 which is loose upon the shaft 3 and meshes with a slidable gear 30 keyed upon the shaft 4 and provided also with a grooved collar 31 and an operating lever 32. The gear 29 is provided with a ratchet 33 engaged by a pawl 34 for the purpose of preventing reverse rotation of the gear 29.

By means of the above construction I am able to obtain a large number of different

speed combinations, and when used in connection with the shutter described in the application above referred to additional combinations are rendered possible. For example: With the gears in position shown in Fig. 1 the shaft 3 will be given a continuous rotation at one speed, and the rotation of the eccentric head 22 will cause the gear 23 to move back and forth from the position shown in Fig. 6 to the position shown in Fig. 7. This reciprocating movement is combined with a slight eccentric or swinging movement and teeth on the gear 23, and on the side opposite the recess 25, will mesh with teeth on the gear 28 immediately before completion of the first half of the rotation of the eccentric. These teeth engage gradually just as the opposite teeth on the gear 23 clear the teeth of the gear 28. The parts are now in the position shown in Fig. 7 and the gear 28 will be advanced a step or about one tenth of a revolution. During the remainder of the rotation of the eccentric the gear 23 will swing back to the position shown in Fig. 6, but there will be no further movement of the gear 28 until the position shown in Fig. 7 is reached. It will be seen therefore that the internal gear will be rotated one step for each rotation of the shaft 3. The great advantage of this intermittent step by step movement is due to the fact that the gear 23 never leaves the internal gear sufficiently to cause a knocking or clicking sound as it meshes with it. I therefore avoid the knocking sound which always accompanies the use of the Maltese cross or Geneva form of feed. It is of course understood that the internal gear 28 will cause the gears 29 and 30 and the shaft 4 and the drum 5 to rotate step by step, one step for each rotation of shaft 3.

By shifting the gear 30 out of engagement with the gear 29, and shifting the gear 19 in engagement with the gear 18 I obtain a continuous, and uniform speed. By shifting the gear 15 out of engagement with the gear 17, and bringing the gear 14 into engagement with the gear 16 I obtain a continuous, variable speed. With the gears 14 and 16 in mesh there will be a comparatively slow speed during a part of the rotation of the shaft 3, and a rapid rotation during the remainder of the rotation. If the shutter is operated so as to expose during the slow movement of the film, that is during the period of slow rotation of shaft 3, a different effect is produced than if the shutter is shifted so as to make the exposure during rapid rotation of the shaft 3. If now the gears 19 and 20 be disengaged, and the gear 30 be brought into engagement with the gear 29, the gear 14 still meshing with the gear 16, an entirely different movement is obtained. This gives a long period of rest and then a very rapid step movement. This combination gives a period of rest 38/40 of the period of rotation, and 2/40 of the period of rotation is employed in movement. With the shutter remaining in the same position the last mentioned combination will give a long exposure followed by a rapid movement, with a very short interval between the exposures. By shifting the shutter I can obtain with this same combination a short exposure followed by a long interval of rest.

Other combinations and changes are also made possible by the construction above described, and especially when employed in connection with the shutter shown in my application, filed June 30, 1910, Serial Number 569,824. The construction herein described can also be used in combination with the photographic feed shown in my application executed and filed July 1, 1910 Serial Number 569,981.

What I claim is:

1. In a device of the kind described, a shaft having an eccentric head, a mutilated gear loosely mounted on said head, and having a radial recess, a stationary pin extending into said recess, an internal gear adapted to be engaged by the first mentioned gear and given a step by step movement, a second shaft, a gear on said second shaft, and a larger gear connected with the internal gear and meshing with the gear upon the second mentioned shaft.

2. A device of the kind described comprising three parallel shafts, intermeshing gears of the same diameter upon two of said shafts, one of the gears being slidable, eccentrically mounted gears upon the same shafts, adapted to mesh with each other, and one of them being slidable, a slidable gear upon the remaining shaft a large gear fixed upon one of the first mentioned shafts and meshing with the slidable gear on the third shaft, a second slidable gear on the third shaft, a gear loosely mounted upon the shaft carrying the large gear, and means for connecting the last mentioned gear with the shaft for the purpose of rotating the last mentioned gear one step for each rotation of the shaft, the said gear being adapted to mesh with the last mentioned slidable gear.

3. In a device of the kind described, a drive shaft, a driven shaft, a film shaft, a slidable hub on the drive shaft, a concentric and an eccentric gear carried by said hub, a concentric and an eccentric gear fixed on the driven shaft and adapted to mesh respectively and in alternation with the gears carried by the hub, a large gear on the driven shaft, a slidable gear on the film shaft adapted to mesh with the last mentioned gear, an eccentric on the driven shaft, a gear loose on the eccentric, a large gear loose on the driven shaft, an internal gear integral with the last mentioned gear, the

internal gear working on the gear mounted on the eccentric, and a slidable gear on the film shaft meshing with the last mentioned large gear.

4. In a device of the kind described, a shaft, an eccentric thereon, a gear wheel having a tooth removed mounted loosely on the eccentric, an internal gear, said first mentioned gear moving across and oscillating within the internal gear, and means for guiding the movement of said first mentioned gear, the internal gear being at all times in mesh with a portion of the first mentioned gear but moving but one step during each rotation of the eccentric.

CHAS. C. SPINKS.

Witnesses:
E. B. McBATH,
REA P. WRIGHT.