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DRIVE MECHANISM FOR AUTOMATIC DISSOLVES IN MOTION PICTURE CAMERAS

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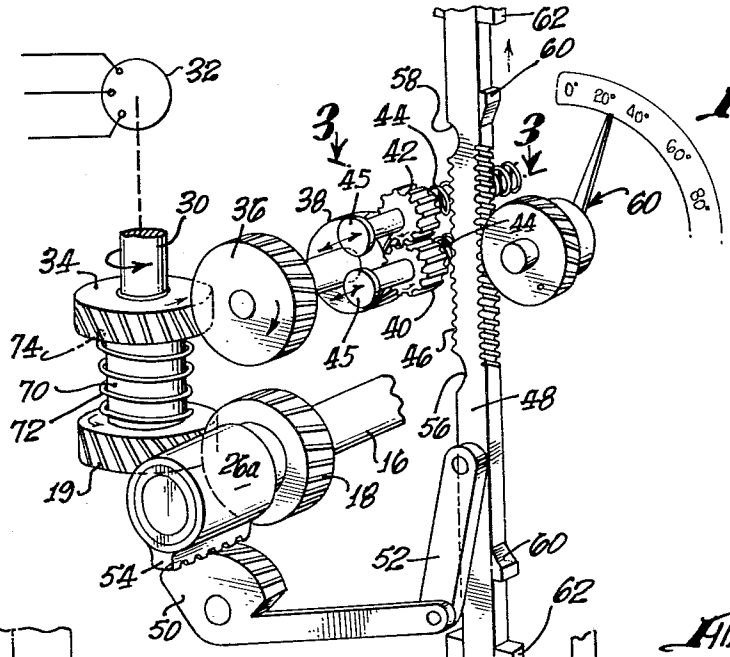


FIG. 2.

FIG. 1.

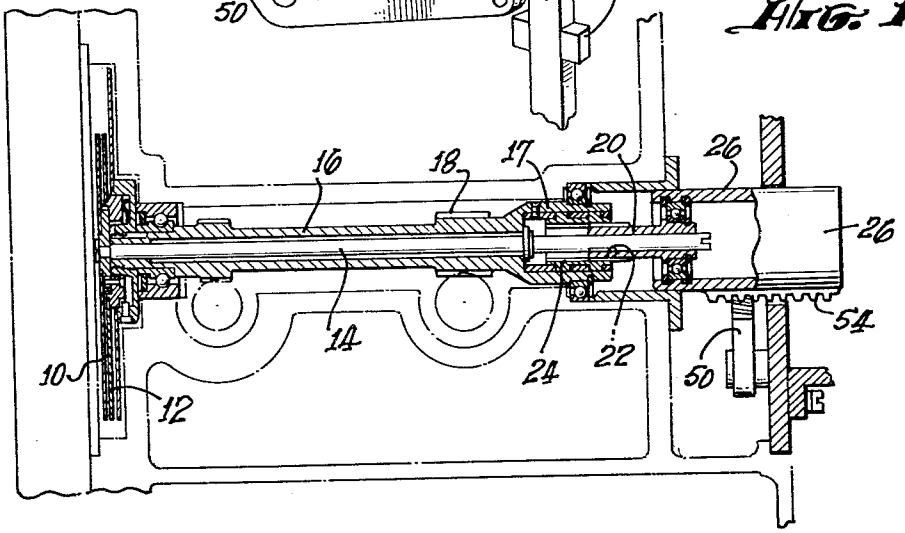


FIG. 3.

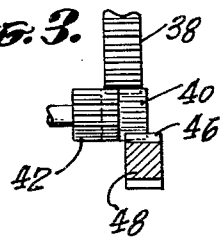
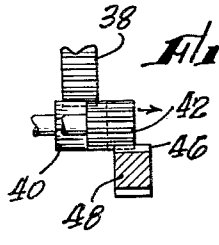


FIG. 4.



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DRIVE MECHANISM FOR AUTOMATIC DISSOLVES IN MOTION PICTURE CAMERAS

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2 Claims. (Cl. 88—16)

In motion picture cameras employing an automatic dissolve shutter, the dissolve is power operated from the camera driving motor. Such driving motors are usually of the three phase type, and frequently when a motor is installed its electrical feed may be mistakenly connected to cause motor rotation in the direction opposite to that which properly operates the dissolve. And that results in jamming, or frequently in gear stripping, when the dissolve mechanism comes up against its limiting stops. The purpose of the present invention is to obviate the possibility of any such damage.

How this is accomplished is explained in the following descriptions, with reference to a standard type of dissolve mechanism shown in the accompanying drawings, in which:

FIG. 1 is a section showing in simplified form the elements of a typical dissolve shutter;

FIG. 2 is a schematic perspective showing the dissolve drive with the present invention; and

FIGS. 3 and 4 are schematic sections on line 3—3 of FIG. 2.

Referring first to FIG. 1, a two-blade dissolve shutter is shown at **10**, **12**, with blade **10** mounted on interior shaft **14** and blade **12** on the exterior hollow shaft **16**. The shutter as a whole is driven through suitable gearing such as that indicated at **18**; and rotational movement of shafts **14** and **16** relative to each other shifts the apertured shutter blades relative to each other to cause the shutter opening to close down or open up, in the manner well known in the art.

To cause that relative movement, the two shafts are interconnected by a spiral splining. As shown here a member such as **20** is slidably splined at **22** on shaft **14** and is externally spirally splined as at **24** in an end portion **17** of external shaft **16**. Member **20** rotates with the whole shutter shaft, but its longitudinal movement, as by longitudinal shifting of such a rotatably stationary member **26**, shifts the rotational relationship between shafts **14** and **16** and between the shutter blades. In the schematic showing of FIG. 2 the longitudinally shiftable member **26** is schematically indicated at **26***a*; the external shutter shaft at **16**, and the shutter drive gearing at **18**, **19**. Driving gear **19** is fixed on shaft **30** which is driven, mediately or immediately, by motor **32**. During camera operation, shaft **30** is constantly driven.

As here shown, the shutter dissolve drive train involves a gear **34** on drive shaft **30**, driving a gear **36** which carries, or its shaft carries, a spur gear **38** with which a pinion **40** meshes. Another pinion **42**, immediately above **40**, meshes with that pinion but not with **38**; so that the two pinions are rotated in opposite directions.

Both pinions **40** and **42** are axially slidable and are normally held in positions to the left in FIGS. 2, 3 and 4 by springs such as indicated at **44** in FIG. 2. They may individually be manually pushed to the right in those figures, as by the buttons indicated at **45**. In their positions to the right they engage teeth **46** of rack **48**; in their positions to the left they disengage the rack. Gear **38**, and the two pinions, are long enough that pinion **40** engages **38**, and pinion **42** engages **40**, in either longitudinal position of either pinion. FIG. 3 shows the lower pinion **40** to the right, engaging rack teeth **46**; FIG. 4 shows the upper pinion **42** to the right engaging the rack teeth.

Meshing engagement of one or the other of the pinions with the rack drives the latter up or down. Vertical movement of the rack drives the shifting member **26***a* (**26** in FIG. 1) axially through the medium of a spiral gear sector **50** connected to **48** by the link **52** and meshing with a spiral rack **54** on **26***a*. The numeral **60** generally designates an indicator driven from rack **48** to visually show the degrees of shutter opening.

Assume the normal direction of rotation of driving shaft **30** to be as indicated by the arrows and that of gear **36** to be as indicated. The normal directions of rotation of pinions **40** and **42** are then as indicated by the arrows. Shifting the rotating pinion **40** into mesh with rack **48** will then move the rack up. When the shutter mechanisms have reached the limit of their movements in one direction, the rack recess **56** comes opposite **40** and movement of the rack and its connected shutter parts stop. In such position the shutter opening is either fully open or fully closed. In that position of the parts pinion **40** is no longer operative to move the rack and shift the shutter opening. But pinion **42** is then in position to mesh with the rack teeth, and when meshed will move the rack down and shift the shutter opening oppositely to its shift by pinion **40**. When the shutter mechanisms have reached their limiting positions in that direction, recess **58** comes opposite pinion **42** and the movement of the rack and the shutter mechanism stops.

The dissolve drive mechanism usually has physical stops limiting relative shutter blade movements in the opposite directions. Those stops may be on the shutter blades themselves and they may be so located here; but they are here shown as stops **60** on the rack that bring up against the fixed rack guides **62** as the shutter blades reach their limiting relative positions and recesses **56** and **58** come into register with pinions **40** and **42**.

Driving gear **34** for the dissolve drive is normally fixed on driving shaft **30**. If, then, driving motor **32** is connected up to rotate shaft **30** in the direction opposite to that indicated, pinions **40** and **42** will be constantly driven in directions opposite to those indicated. Pinion **40** when meshed with the rack will then drive the rack down. The physical movement stop, here illustrated as the lower stop **60**, will then bring up against its stop shoulder **62** with recess **58** opposite pinion **42**, not pinion **40**. Unless pinion **40** is released before that occurs the drive mechanism will be jammed and the teeth of one or more of the driving gears (commonly of Bakelite or other plastic) stripped off. The same things will occur if pinion **42** is meshed with the rack, driving the rack up and bringing upper stop **60** up against its stop shoulder **62** before recess **56** can reach that pinion.

All those difficulties are here entirely obviated by providing a one-way or over-run drive between drive shaft **30** and driving gear **34** to drive that gear only in the normal, indicated, direction. As here shown, gear **19** carries a cylindrical hub **70** fixed to that gear. A spiral spring **72** closely surrounds hub **70** and has one end **74** attached to gear **34**. The other end of the spring bears against gear **19** which is fixed on drive shaft **30**. The coiling of spring **72**, here shown as left-handed, is such that rotation of **19** and hub **70** in the normal, proper, direction contracts the spring around hub **70** to positively drive gear **34**. On the other hand, if shaft **30** and gear **19** are rotating in the opposite and wrong direction, the drag of **20** on the spring expands it if there is any resistance to the rotation of gear **34**. Consequently the driving torque on gear **34** in that direction is small or negligible and when the movement of the shutter dissolve drive mechanism is stopped, no damaging force is exerted on any of its parts.

I claim:

1. In a shutter dissolve mechanism for a camera, a multiple bladed apertured shutter in which relative movement

between the shutter blades varies the size of the shutter aperture, a motor driven driving shaft adapted to be rotated in a forward or a reverse direction, a driving train for relatively moving the shutter blades, said driving train including a gear toothed member movable in opposite directions and connected to the shutter blades to correspondingly move tthem relatively in opposite directions, a pair of gears driven in opposite directions from the driving shaft, said gears being each independently movable into and out of mesh with the gear toothed member, movement stops associated with the driving train and limiting the movements of the gear toothed member and the shutter blades in opposite directions, and the driving connection between the driving shaft and the pair of oppositely driven gears including an over-running drive element that forcibly drives said pair of gears when the driving shaft is rotating only in said forward direction.

2. In a shutter dissolve mechanism for a camera, a multiple bladed apertured shutter in which relative movement between the shutter blades varies the size of the shutter aperture, a motor driven driving shaft adapted to be driven in a forward or a reverse direction, a driving train for relatively moving the shutter blades, said driving

train including a gear toothed rack movable in opposite directions and connected to the shutter blades to correspondingly move them relatively in opposite directions, a pair of oppositely rotating gears each independently movable into and out of mesh with the rack, a gear train driving said pair of gears from the driving shaft and including a driving gear driven from said driving shaft, movement stops associated with the driving train and limiting the movements of the rack and the shutter blades in opposite directions and a normally engaged over-running drive element in said gear train that forcibly drives said driving gear from said driving shaft when that shaft is rotating only in said forward direction and disengages when that shaft is rotating in said reverse direction.

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