

[54] **SELECTIVE SCANNING CONTROL FOR PROJECTION APPARATUS**

[72] Inventors: **Frederick G. Knowles**, Rochester; **Clarence R. Taylor**, Penfield, both of N.Y.

[73] Assignee: **Eastman Kodak Company**, Rochester, N.Y.

[22] Filed: **Feb. 3, 1970**

[21] Appl. No.: **8,309**

[52] U.S. Cl. **242/67.4, 40/93, 242/201, 352/173**

[51] Int. Cl. **B65h 17/02, G09f 11/24**

[58] Field of Search **242/67.3 R, 67.4, 200, 201; 352/129, 173; 40/93; 353/74**

[56] **References Cited**

UNITED STATES PATENTS

1,571,610 2/1926 Tingley **242/67.4**

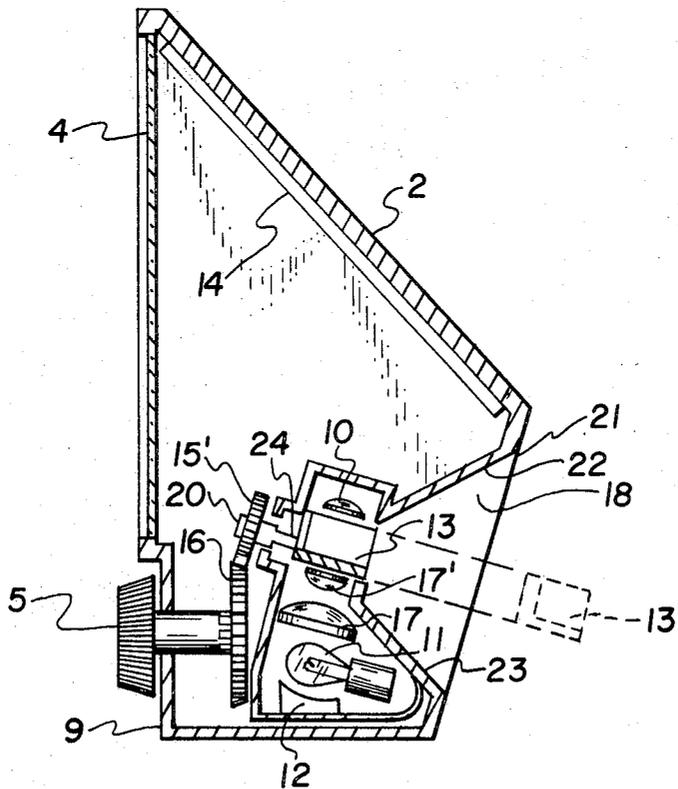
3,523,657	8/1970	Hearon	242/67.4 X
1,845,550	2/1932	Metze	242/67.4
1,848,336	3/1932	Ferrero	242/67.4
2,012,437	8/1935	Segal	242/67.4
1,454,810	5/1923	Cowley	242/67.4
1,414,406	5/1922	Harthun	40/93

Primary Examiner—George F. Mautz
Assistant Examiner—Edward J. McCarthy
Attorney—R. W. Hampton and R. Lewis Gable

[57] **ABSTRACT**

Apparatus is disclosed for scanning and projecting a set of images carried by a filmstrip wherein the strip may be transported in either direction by a single control knob. Rotation of the control knob causes a main or first drive shaft to be moved to either a first or second position and to there respectively engage either second and third shafts. In turn, the second and third shafts are respectively coupled to take-up members about which the filmstrip may be wound.

6 Claims, 8 Drawing Figures



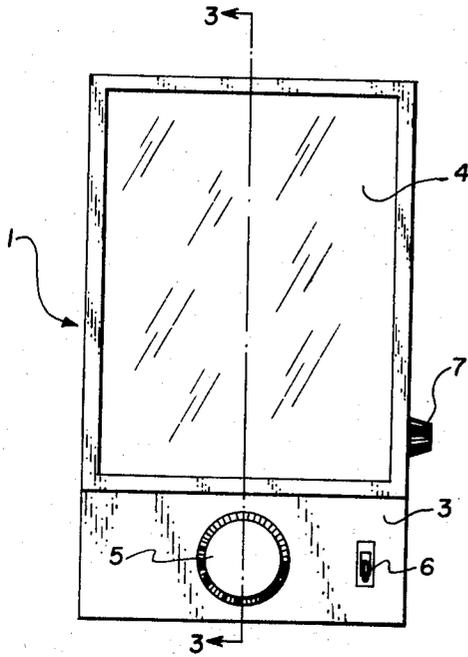


FIG. 1

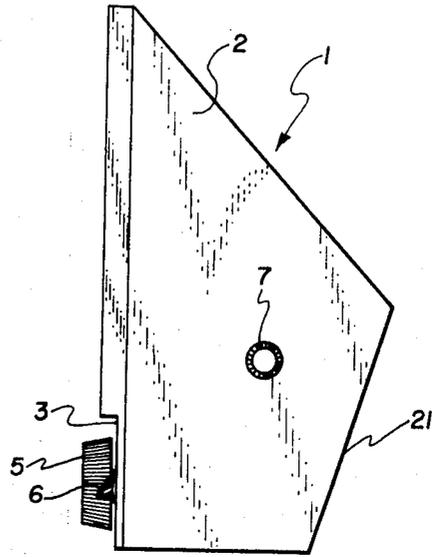


FIG. 2

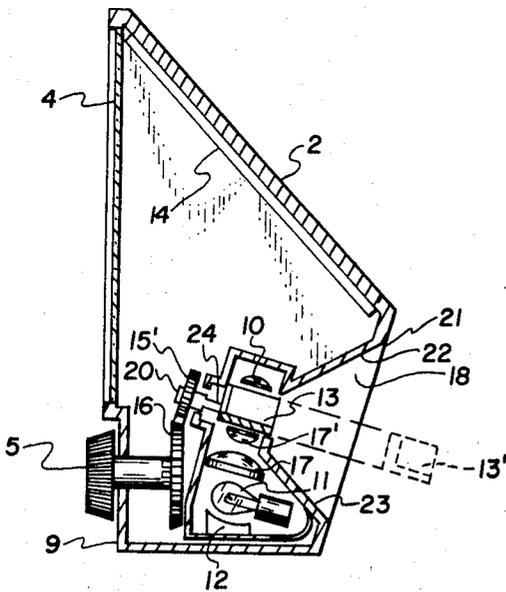


FIG. 3

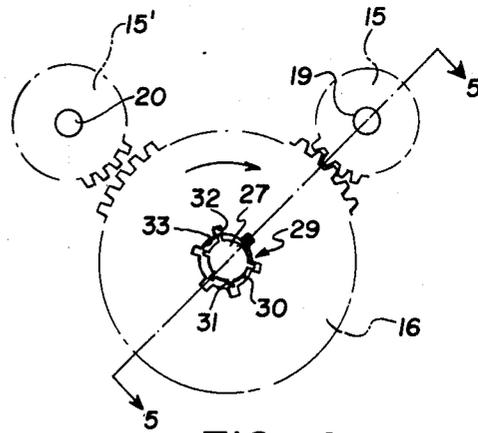


FIG. 4

FREDERICK G. KNOWLES
CLARENCE R. TAYLOR
INVENTORS

R. Lewis Hable

W. Hampton

BY

ATTORNEYS

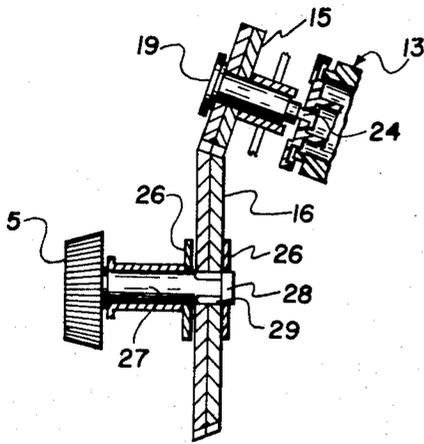


FIG. 5

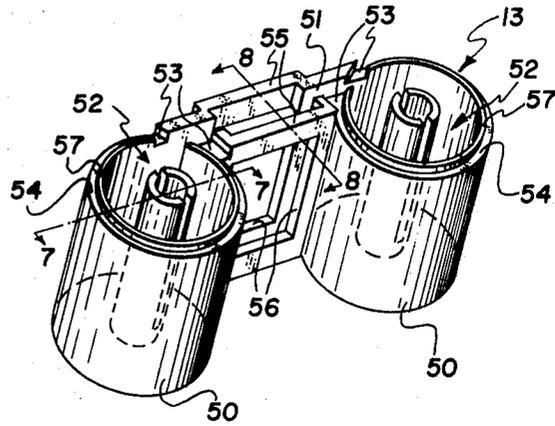


FIG. 6

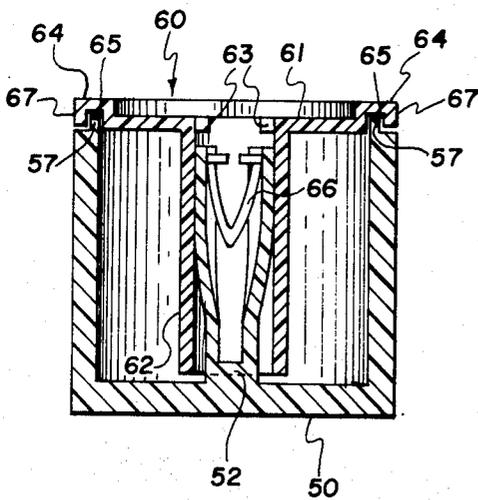


FIG. 7

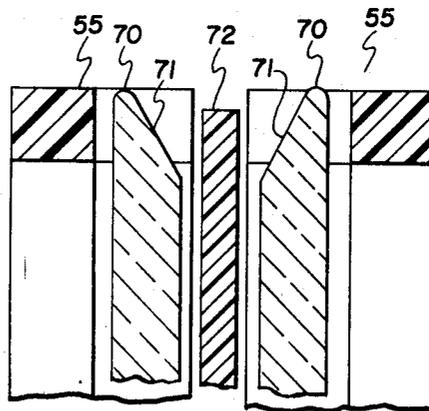


FIG. 8

FREDERICK G. KNOWLES
CLARENCE R. TAYLOR
INVENTORS

R. Lewis Gable

R. Hampton

BY

ATTORNEYS

SELECTIVE SCANNING CONTROL FOR PROJECTION APPARATUS

CROSS-REFERENCE TO RELATED APPLICATION

Reference is made to commonly assigned copending U.S. Pat. application Ser. No. 8,267, entitled APPARATUS FOR STORING STRIP MATERIAL filed Feb. 3, 1970 in the names of Frederick Knowles and Clarence Taylor; and to commonly assigned copending U.S. Pat. application Ser. No. 8,266, entitled cassette Type Microfilm Reader; filed Feb. 3, 1970 in the names of Frederick Knowles and Clarence Taylor.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to apparatus for projecting images carried by an information bearing medium onto a display surface. A storage apparatus commonly referred to as a cassette for use in such apparatus is described in applicants' copending U.S. applications Ser. Nos. 8,266 and 8,267.

More particularly the invention relates to a small compact microfilm viewer into which a cassette may be easily and readily inserted. While the following description of the invention is of a viewer adapted for use with such a cassette as described in the copending application, it is understood that the apparatus is not limited to such use but may be adapted for use with cassettes or other storage apparatus having different purposes and features.

2. Description of the Prior Art

There are many viewers available for reading microfilm images but most are large and bulky. In addition, viewers which utilize an information bearing strip for carrying the images have incorporated drive mechanisms involving several intermediary gears or a longitudinally shiftable main drive gear. This has resulted in a relatively complex scanning control mechanism and has prevented the wide use of small, portable microfilm viewers.

SUMMARY OF INVENTION

It is accordingly a principal object of the present invention to reduce the size and weight of viewers of microfilm images.

A further object of this invention is to simplify the operation of moving the information bearing strip in either direction.

A still further object of this invention is to facilitate the insertion and removal of storage apparatus such as a cassette for receiving information bearing strips into projection apparatus.

In accordance with the teachings of this invention, these and other objects are accomplished by apparatus for selectively projecting images from an information bearing strip and including a unique drive mechanism which allows movement of the strip in either direction for scanning purposes. A single scanning knob or member is connected at one end thereof to a main drive having a drive gear loosely mounted at its other end which drive gear may be disposed in either of two positions. Rotation of the scanning knob causes the drive gear to be selectively disposed in one of the two positions to engage one of two secondary drive shafts, which are coupled to take-up members. Thus, rotation of a single control knob causes selective movement of the film strip between the take-up members.

The invention, and its objects and advantages, will become more apparent in the detailed description of the preferred embodiment presented below.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention however, as to its organization and operation together with further objects and advantages thereof, will best be understood by reference to the detailed description presented below taken in connection with the accompanying drawings in which:

FIG. 1 is a front view of a projection apparatus incorporating the selective scanning apparatus in accordance with the teachings of this invention,

FIG. 2 is a side view of such projection apparatus;

FIG. 3 is a sectional view of the projection apparatus taken along the line 3—3 of FIG. 1,

FIG. 4 is an enlarged view of the selective scanning mechanism shown in FIG. 3,

FIG. 5 is a sectional view of the scanning mechanism taken along the line 5—5 of FIG. 4,

FIG. 6 is a view of an unloaded microfilm cassette for use in the viewer of FIGS 1—3,

FIG. 7 is a cross-sectioned view of a loaded cassette or storage apparatus as taken along the line 7—7 of FIG. 6,

FIG. 8 is a partial, cross-sectioned view of a loaded film cassette disposed within the projection apparatus as taken along the line 8—8 of FIG. 6.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

With reference to drawings and in particular to FIGS. 1 and 2, a projection apparatus in accordance with the present invention is shown generally at 1 and comprises a main housing 2 and a front wall 3 which contains therein a viewer screen or display surface 4. Projecting from the projection apparatus 1 are a scanning control knob 5, on-off switch 6 and a focusing knob 7.

Referring now to FIG. 3, the optical system of the projection apparatus 1 includes a projection lamp or other source of radiation 11 having a reflector 12 disposed on one side thereof. Light from the lamp 11 is directed by the reflector 12 through lens systems 17 and 17', and projection lens 10 to a mirror 14 mounted on an inner surface of the main housing 2. The mirror 14 serves to reflect the projected image onto the viewing screen 4. Focusing knob 7 is interconnected with projection lens 10 to allow focusing of the projected image on the viewing screen 4.

A rear wall 21 of the main housing 2 contains a central aperture 18, through which a microfilm cassette or storage apparatus 13 may be inserted. A pair of upper and lower outwardly extending walls 22 and 23 serve to direct the cassette 13 into the proper position within the viewer 1 for projection of the images contained therein. A cassette 13' is shown in phantom to illustrate the proper position for a cassette prior to insertion into the viewer 1.

A typical cassette 13 for use in the viewer 1 is shown in FIG. 6. The film cassette 13 includes a pair of cylindrical shells or storage cavities 50 and a film passageway 51 which interconnects the shells 50. The shells 50 and the passageway 51 are open on one side to permit the easy insertion of the film strip. A shaft 52 is contained within each shell 50, the shaft being split along at least part of its length to permit the separation of the portions of the shaft 52 by a resilient fastener 66 as shown in FIG. 7. A retaining flange 57 and a recess 53 are formed on the open rim 54 of each shell 50. The passageway 51 is formed by a pair of parallel walls 55, each containing a window 56 which cooperates with the passageway 51 to frame the microfilm images or frames carried by the strip for projection.

The cassette 13 is shown in FIG. 7 after loading with a spool or take-up member 60. The spool 60 is formed with a flange or cover portion 61 at one end only and with a central core 62 containing ridges 63. The edge of the flange 61 is formed with a raised portion 64 in which is contained a groove 65 and lip 67 which are disposed about the periphery of flange 61. The retaining flange 57 on shell 50 is disposed to mesh with the groove 65. The lip 67 of the spool 60 passes through the recesses 53 of the cassette 13 as the spool 60 is rotated. The spool 60 is rotatably mounted and secured to the shaft 52 by means of the resilient fastener 66 which is inserted into the slot of shaft 52 and forces the separate portions of the shaft 52 apart to contact the walls of central core 62. However, the frictional force developed between the shaft 52 and the central core 62, while sufficient to hold the spool 60 on the shaft 52, is not sufficient to prevent rotation of the spool 60. The filmstrip is attached to the spool 60 in any well known manner and threaded through the passageway 51 to a second spool 60 contained in the second shell 50.

FIGS. 4 and 5 show a selective scanning mechanism by which one knob 5 can be utilized to control movement of the microfilm strip in either direction for scanning. Drive members taking the form of gears 15 and 15' are rotatably mounted on shafts 19 and 20 respectively having end portions which terminate in keys or engaging members 24. As the cassette 13 is loaded into the viewer, the keys 24 are inserted within and couple with the central cores 62. Both keys 24 are slightly smaller than the diameter of the central cores 62 and engage the ridges 63. Each key 24 serves to transmit a rotary motion from the gears 15 and 15' to the spools 60.

As shown in FIGS. 4 and 5, a drive gear 16 is loosely mounted on a spline shaft 27 and retained thereon by washers 26. The knob 5 is mounted on the other end of shaft 27 with respect to the drive gear 16. The shaft 27 is rotatably mounted within viewer 1. A plurality of splineways 30 are formed in an end portion 28 of the spline shaft 27 to form a series of keys 31 which encircle the shaft 27. Further, a plurality of grooves 32 are formed in central opening 29 of the drive gear 16 to thereby define a series of keys 33. The maximum dimension across the end portion 28 of the shaft 27 is smaller than the maximum dimension across the central opening 29 of the drive gear 16, measured from the bottom of a groove 32 to the top of an opposing key 33, as may best be seen in FIG. 4. As the knob 5 is rotated, for instance, in a clockwise manner as shown in FIG. 4, shaft 27 is rotated with the keys 31 of the shaft 27 partially engaging the keys 33 of the drive gear 16. Continued rotation of knob 5 will cause clockwise rotation of the drive gear 16, which will then move to a first position thereby engaging the gear 15 and being disposed out of engagement with the gear 15'. Rotation of the knob 5 in a counterclockwise direction as shown in FIG. 4 will rotate shaft 27 in the opposite direction. As a result, the drive gear 16 will then rotate in the opposite, counterclockwise direction and, because of the relative dimension of the shaft 27, i.e., having a smaller diameter than the central opening 29, will be moved to a second position to engage the gear 15' and to be displaced from the gear 15. The filmstrip may then be driven in either direction by means of a single control knob 5. It can be seen that the cassette 13 may be removed from the viewer 1 at any time in the projection cycle. There is no need to rewind the filmstrip onto either spool 60.

In operation, the pair of spools 60 having the end portions of the filmstrip bearing the desired information attached thereto, are loaded into the film cassette 13. The film cassette 13 is then loaded into the viewer 1 through the central aperture 18 as may best be seen in FIG. 3. As shown in FIG. 8, a pair of transparent flats 70 mounted in the viewer 1 extend into the passageway 51 of the cassette 13 after the cassette 13 has been loaded into the viewer 1. The flats 70 each contain an inwardly sloping surface 71 at their outer ends. The surfaces 71 serve to guide a filmstrip 72 into a position between the flats 70 as the cassette 13 is loaded into the viewer 1. The filmstrip or web 72 will then be properly positioned for projection of the images contained therein onto the display surface 4. When the switch 6 is placed in the "on" position, light rays from the projection lamp 11 pass through the lens systems 17 and 17', the flats 70, the information bearing image, the projection lens 10 and are reflected by mirror 14 in the main housing 2 to project the image onto the display surface 4. The focusing knob 7 may then be used to properly position the projection lens 10 to provide a properly focussed image on the surface 4. The control knob 5 may then be used to move or scan the filmstrip in either direction until the desired image is located and projected onto the surface 4.

The invention has been described in detail with particular reference to preferred embodiments thereof, but it will be understood that variations and modifications can be effected within the spirit and scope of the invention.

We claim:

1. Apparatus for selectively driving a strip, said apparatus comprising:

first and second driven members for selectively moving the strip,

a shaft rotatable in opposite directions and having a first plurality of teeth,

a rotatable drive member having means defining an opening therethrough and a second plurality of teeth extending into said opening,

said drive member being mounted on said shaft with a part only of said first plurality of teeth and said second plurality of teeth being in engagement, and

said drive member being translatably movable with respect to said shaft between a first position wherein said drive member engages said first driven member and to a second position wherein said drive member engages said second driven member,

said shaft and said drive member cooperatively interfitting in a manner such that when said shaft is rotated in one of said opposite directions, said drive member is translatably moved to said first position to drivingly engage said first driven member and when said shaft is rotated in the other of said opposite directions, said drive member is translatably moved to said second position to drivingly engage said second driven member.

2. Apparatus for projecting images carried by a strip of information bearing medium, said apparatus comprising:

means for projecting images from the strip,

first and second driven means for directing the strip therebetween and past said means for projecting,

a shaft rotatable in opposite directions and having a first plurality of engaging elements,

a rotatable drive member having means defining an opening therethrough and a second plurality of engaging elements extending into said opening,

said drive member being mounted on said shaft with a part only of said first plurality of engaging elements and said second plurality of engaging elements being in engagement,

said drive member being translatably movable with respect to said shaft between a first position wherein said drive member engages said first driven member and a second position wherein said drive member engages said second driven member,

said shaft and said drive member cooperatively interfitting in a manner such that when said shaft is rotated in one of said opposite directions, said drive member is translatably moved to said first position to drivingly engage said first driven member and when said shaft is rotated in the other of said opposite directions, said drive member is translatably moved to said second position to drivingly engage said second driven member.

3. A drive mechanism comprising, first and second driven means,

shaft means rotatable in opposite directions and having first engaging means,

rotatable drive means having means defining an opening and second engaging means extending into said opening,

said drive means being mounted on said shaft such that a portion only of said first and said second engaging means are in engagement,

said drive means being translatably movable with respect to said shaft between a first position wherein said drive means engages said first driven means and a second position wherein said drive means engages said second driven means,

said shaft and said drive member cooperatively interfitting in a manner such that when said shaft means is rotated in one of said opposite directions, said drive means is translatably moved to said first position to drivingly engage said first driven means and whereby when said shaft means is rotated in the other of said opposite directions said drive means is translatably moved to said second position to drivingly engage said second driven means.

4. The drive mechanism of claim 3 wherein said first engaging means comprises a first plurality of engaging elements, wherein said second engaging means comprises a second plurality of engaging elements and wherein said drive means is

5

6

mounted on said shaft such that a part only of said first and said second engaging elements are in engagement.

5. The drive mechanism of claim 3 wherein said first and second driven means are rotatably mounted.

6. The drive mechanism of claim 3 wherein said first engaging means includes a first plurality of teeth disposed about said

shaft means, wherein said second engaging means includes a second plurality of teeth disposed about said opening and extending thereinto and wherein said drive means is mounted on said shaft means such that a part only of said first and said second plurality of teeth are in engagement.

* * * * *

10

15

20

25

30

35

40

45

50

55

60

65

70

75