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(54) INFORMATION-PROCESSING APPLIANCES FOR USE WITH A STRIPLIKE INFORMATION CARRIER CONTAINED IN A CARTRIDGE

(71) I, KARL VOCKENHUBER, of 118 Pötzleinsdorferstrasse, Vienna 18, Austria, an Austrian citizen, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to apparatus, such as a small film projector, adapted to be cartridge loaded.

Various types of cartridges have already been proposed for use with motion-picture projectors for substandard film. The cartridges of each of these types differ in capacity and are intended to receive film wound on supply reels. The cartridges of the type which have been proposed so far differ in cartridge size, cartridge form means required to drive the supply reels in the cartridge, and means required to hold the cartridges on a projector, etc. For a manufacturer of projectors, this means that in selecting a design for his projectors he must choose one of these types required to hold the cartridges on a projector, this means that he can use only cartridges of the type for which the projector is designed. Hence, a user of a projector either cannot project films, e.g., rented films, which are supplied in cartridges for which his projector is not designed, or he must procure another projector designed for use with cartridges of a second type. This is a serious disadvantage for the users of substandard film projectors. For a manufacturer, this means that the numbers in which a given projector is sold will be smaller than they would be if there were only cartridges of a single type. The

reduction of the numbers in which a given projector is sold increases the cost of the projector. The same remarks are applicable to apparatus which may be used to record on or reproduce from magnetic tape. Numerous types of cartridges have already been proposed for magnetic tape-handling apparatus.

In accordance with the present invention there is provided apparatus for use with different types of reel cartridges in one of which the reel is peripherally driven and in the other of which the reel is centre driven, and providing a common path leading to a take-up reel position and along which strip, unwound from a cartridge when in use, is guided past a strip-information-handling station, such apparatus including cartridge locating surfaces for locating each of the cartridge types in its operating position; a first drive unit for peripherally driving said one cartridge, when in its operating position; a second drive unit for centre-driving said other cartridge, when in its operating position; and, feed-out means for extracting a leading end of the strip from a cartridge to be used, when the cartridge reel is driven by its drive unit in the strip unwinding direction, and for feeding such leading end into the common path for onward movement past said station to the take-up reel.

Preferably the cartridge locating surfaces provide a first assembly for locating said one cartridge in its operating position and a second assembly for locating said other cartridge in its operating position. Suitably the apparatus is constructed as a motion picture projection apparatus and having motion pic-

ture projection equipment at said station.

In the preferred construction both drive units are driven by the same drive. In one such arrangement the common drive is provided by a motor mounted in a base and first and second assemblies are respectively provided on two attachments each of which can be fitted to a common mounting position on the base, each attachment being provided with a drive unit and a feed-out device appropriate to the cartridge type it is to accommodate, and with drive connections which are released by separation of the attachment from the base and through which drive is transmitted from the motor to the drive unit and feedout device.

In such an arrangement, the requirements of the user can easily be met in that the attachment desired by the buyer is mounted on the base of the apparatus. Hence, the base may be made in large numbers so that the cost of the apparatus is reduced. If the buyer of an apparatus intends to use cartridges of different types, he need no longer procure two different apparatus but it will be sufficient for him to have different attachments for use with a single base. Alternatively, the apparatus may be integral and be designed so that cartridges of different types may be fixed to the apparatus in one and the same area or in different areas and the drive units for use with cartridges of a given type are adapted to be rendered ineffective, removed or immobilised when a cartridge of another type is to be used.

With that arrangement, the cartridge may be relatively small. A difficulty may arise because a feed-out device of the feed-out means is not always aligned with the extraction opening of the cartridge or the centre of the reel in the cartridge where cartridges of different type are used. These difficulties may be eliminated by so arranging the locating assemblies that the centres of the reels having different capacities are substantially disposed on one and the same line regardless of the type of cartridge which is used. In this connection, the centres of the reels need not actually be disposed on one line, provided that they are substantially disposed thereon. The above-mentioned difficulty may alternatively be avoided by providing the apparatus with sensing means for detecting the type of cartridge fixed to it. In a development of the invention, the sensing means may control a displaceable carriage, on which a feed-out device is mounted and which is arranged to be controlled in response to the type of cartridge detected by the sensing means so that the feed-out means is always aligned with the extraction opening of the cartridge.

In one such arrangement, a pivot of an arm carrying the feed-out device is adjustable to at least two positions, one of which repre-

sents an optimum for cartridges of a first type and the other an optimum for cartridges of a second type.

The assemblies for locating cartridges of different types will generally have to be different. These locating assemblies may comprise elements, which are provided on the apparatus and which cooperate with apertures or projections provided on the cartridge. Because cartridges of different types have substantially the same main dimensions, the locating assemblies may be provided on the apparatus generally in the same area and an arrangement provided for preventing a cartridge of a given type mounted on the apparatus from interfering with means utilised with cartridges of the second type. Preferably the assemblies for locating cartridges of a first type are rigid in the direction in which cartridges of said type are applied to the apparatus and are movable in the direction in which cartridges of the second type are applied to the apparatus.

Within the scope of the invention, the apparatus may be designed to have cartridges of different type mounted thereon in different areas and be provided in each of said areas with locating assemblies and drive units for cartridges of the associated type. This arrangement will eliminate the difficulties which are due to the provision of different drive units in a single area. In apparatus for handling magnetic tape, guide means defining the common path may guide the magnetic type from the different areas to common recording and reproducing means.

Apparatus having feed-out means may be provided with a separate feed-out device in each area which is associated with cartridges of a given type. This feature will contribute to a clear and relatively simple structure.

Alternatively, the feed-out means may be common to cartridges of different types and may be movable to positions adjacent to cartridges fixed in different areas. In this case, a single feed-out device may be used for cartridges of all types of cartridges which are contemplated.

To enable an adaptation to openings of different size provided to receive the feed-out device, it is a feature of the invention to provide for the removal of the leading end of the strip from the roll a feed-out device which comprises movable film-guiding elements, which are movable into the cartridge and which close free openings which might otherwise exist between the cartridge wall and the feed-out device when moved into the cartridge.

Embodiments of the invention will now be described, by way of example only, with reference to the accompanying largely diagrammatic drawings, in which

Figure 1 is a motion picture projector

according to the invention for substandard film;

Figure 2 is an enlarged view showing a detail of a modified projector;

5 Figure 3 illustrates the operation of a sensing arm;

Figures 4 and 5 illustrate a modification of Figure 2;

10 Figure 5 being an elevation viewed from line V—V of Figure 4;

Figure 6 illustrates another embodiment of the invention comprising an axially movable reel mandrel;

15 Figures 7 and 8 illustrate another embodiment of the invention, Figure 8 being a circuit diagram of the embodiment of Figure 7;

Figure 9 shows an embodiment of the invention in which cartridges of different types are fixed to the apparatus in different areas, which are disposed one behind the other;

20 Figure 10 illustrates another embodiment in which cartridges of different types are secured to different areas disposed one beside the other;

25 Figure 11 is a top plan view of the embodiment of Figure 10;

Figure 12 is a special embodiment of a feed-out device in a view which is similar to that of Figure 11;

30 Figures 13 to 15 show different means for controlling a feed-out device;

Figures 16 and 17 show means for locking two mode control switches, which are provided for two cartridge fixing areas.

35 Figure 18 shows a similar design provided with electrical means;

Figure 19 shows a mode control switch which is suitable for use with different cartridge-fixing areas;

40 Figure 20 shows another design in which a part which carries the locating assemblies can be connected to the projector;

45 Figure 21 shows a motion picture projector for substandard film, which projector is provided with an attachment for use with cartridges of one type;

Figure 22 is an elevation showing part of the projector provided with a different attachment;

50 Figure 23 is a perspective view showing the top of the base structure of a projector;

Figures 24 and 25 show further different embodiments according to the invention;

55 Figures 26 and 27 are coordinated views showing a cartridge-locating assembly of a motion picture projector for substandard 8-mm. film and a cartridge of a first type (Type A);

60 Figures 28 and 29 are similar views for cartridges of a second type (Type B);

Figure 30 shows another embodiment with a Type A cartridge;

Figure 31 shows the same embodiment with a Type B cartridge;

65 Figure 32 shows a motion picture projector

for substandard film provided with a cartridge selector switch; and

Figures 33 and 34 show details of this embodiment viewed in the directions indicated by arrows XXXIII and XXXIV, respectively, in Figure 32. 70

Referring to Figure 1 cartridges 2, 3 of different types can be fixed to a motion picture projector 1 for substandard film. A feed-out device 4 is movable into the extraction opening of cartridge 2 or cartridge 3. The cartridges 2, 3 differ not only in external configuration; cartridge 2 is provided in one end wall with an opening, not shown, through which a first drive unit provided friction wheel 5 may enter the wheel 5 being mounted on a lever 6 that is pivoted on a pivot 7. The friction wheel 5 is adapted to be driven by means which are not shown and serves to drive the supply reel in the cartridge 2. 75 For this purpose, the friction wheel 5 engages an end flange of said reel. 80

The cartridges 3 are not provided with such opening in an end wall but adjacent to the centre 8 of the supply reel in the cartridge 3 there is provided an aperture through which a second drive unit provided by a reel mandrel 9, which is mounted on the projector 1, can extend. The centre 10 of the reel in the cartridge 2 is not adjacent to the reel mandrel 9 and the cartridge 2 has no aperture for receiving the reel mandrel 9. It will be understood that for the use of cartridges 2 the reel mandrel 9 must be removed from the area of the cartridge whereas the friction wheel 5 must be swung out if cartridges 3 are to be used. These remarks will also be applicable if film reels not accommodated in cartridges are to be used instead of the cartridges 3. 85 It will be understood that the illustrated projector 1 may be used with cartridges 2, 3 as well as with reels which are not accommodated in cartridges. 90

Figure 2 illustrates an arrangement for a mutual control of the respective drive units. 95 The reel mandrel 9 is mounted on a reel-carrying arm 11, which is pivoted on a pivot 12 to which a cam 13 is fixed. 100

A tension spring 14 holds a push rod 15 against the cam 13, the push rod 15 being guided by a pin-slot arrangement. The push rod 15 is provided at its end with a stop 16. In dependence on the position of the push rod 15, the stop 16 is in register with a complementary stop 17 carried by the pivoted arm 6 for the friction wheel 5 or releases said stop 17. A compression spring 18 urges the pivoted arm 6 against a pin 20, which extends through a slot 19 of the pivoted arm 6. The pin 20 is secured to an actuating rod 21, by which the pivoted arm 6 can be actuated and moved to its operative position. 105

In the position shown, the reel-carrying arm 11 is in position of rest and the push rod 15 is in its right-hand position, in which the 110 115 120 125 130

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stops 16, 17 are out of register so that the friction wheel 5 can be swung into a cartridge 2a.

5 If a cartridge 3 or 3a is secured to the appliance, the reel mandrel 9 is required to drive the supply reel in such cartridge. In this case, the reel-carrying arm 11 is swung in the counterclockwise sense and the cartridge 3 or 3a is mounted on the reel mandrel 9. During a pivotal movement of the reel-carrying arm 11, the cam 13 displaces the push rod 15 to the left so that the stop 16 is in register with the stop 17 and the friction wheel 5 cannot be pivotally moved even if the actuating rod 21 is actuated.

10 Figure 2 shows also the centres 8, 8a and 8b of cartridges which differ in size and are of a type which is similar to cartridges 3 and 3a. The centres 8, 8a, 8b are disposed on a sector 22 of a circle, which has a radius which is equal to the distance between the centres of the pivot 12 and the reel mandrel 9. The centres 10, 10a, 10b and 10c of reels accommodated in cartridges which are similar to cartridges 2, 2a lie on a straight line 23. The sector 22 and the line 23 are arranged so that the centres of the reels of differing capacities lie virtually on a single line for cartridges of each of the types which are used and are only slightly spaced from said line. This arrangement will ensure that the feed-out device 4 is always in register with the exit opening of the cartridge regardless of its type and size.

35 Figure 3 shows different means for disabling the friction wheel 5. A sensor 25 detects apertures 24 of the cartridges 3. The sensor 25 comprises a sensing pin 26, which is disposed adjacent to the apertures 24 and secured to an arm 28; the arm 28 is pivoted on a pin 27 and is constantly biased by a spring 29. The arm 28 carries a locking pin 30, which in the in-operative position of the arm 28 extends into the path of the pivoted arm 6 for the friction wheel 5.

45 If a cartridge 2 which has no aperture 24 is secured to the appliance, the cartridge 2 will depress the sensing pin 26 to move the locking pin 30 out of the path of the pivoted arm 6 so that the latter can be swung in by means of the actuating rod 21. If a cartridge 3 rather than a cartridge 2 is fitted into the apparatus, the sensing pin 26 will enter the aperture 24 and the locking pin 30 will remain in the path of the pivoted arm 6 to lock the same. It will then be impossible to impart a pivotal movement to the arm 6 even by an erroneous operation of the actuating rod 21.

60 In the embodiment shown in Figure 2, the centres 8, 8a 8b or 10 to 10c are disposed substantially on a single line to ensure that the feed-out device 4 is always in register with the exit opening of the cartridge which is used. A different arrangement for the same

purpose is shown in Figures 4 and 5. Cartridges 2, 2a and 3, 3a are secured to the projector in such a position that the lower right corner of each cartridge is disposed at the same point. As a result, the centres of the exit openings disposed on the underside of the cartridge will be increasingly displaced to the left as the size of the cartridges increases. To centre the device 4 on the exit opening of the cartridge which is used, the device 4 is mounted on a carriage 31, which is guided on rails 32, 33 and provided with a rack 34 having skew teeth. A compression spring 35 urges the carriage 31 toward stops 36, 37, which are normally engaged by the carriage 31 and when cartridges 2 or 3 are fitted into the appliance 1. The device 4 will be properly positioned to enter the exit openings of cartridge 2 or 3 when the carriage 31 is in engagement with stops 36, 37.

80 A sensing lever 38 is urged by a spring 39 out of the wall of the projector. The sensing lever 38 is connected to a toothed sector 40 having skew teeth. If a cartridge 2a or 3a having a larger capacity is fitted into the projector 1, said cartridge will turn the sensing lever 38 in the counter-clockwise sense in Figure 5 so that the toothed sector 40 engages the rack 34. As the sector 40 meshes with the rack 34, the carriage 31 is displaced against the action of the spring 35 to align the device 4 with the exit opening of cartridge 2a or 3a. A sensing lever 41 having a toothed sector 42 is provided for cartridges having a capacity which is between the capacity of cartridges 2, 3 and the capacity of cartridges 2a, 3a. The sensing lever 41 and sector 42 are similar in function to the sensing lever 38 and sector 40. It will be understood that the free end of the sensing lever 41 protrudes less from the projector housing than the free end of the sensing lever 38. Furthermore, the sector 42 extends over a smaller angle than the sector 40 so that the application of a medium-size cartridge to the projector 1 will displace the carriage 31 to the left by a smaller distance than the application of a cartridge 2a, 3a having a very large capacity.

115 Different means for interlocking two reel-driving means are shown in Figure 6. In this embodiment, the reel mandrel 9 is axially displaceable and is urged by a spring 43 to its operative position. The reel mandrel 9 is driven by a belt 44 and a belt pulley 45, the belt pulley 45 being secured to the stub shaft of the mandrel 9. When the reel mandrel 9 is in its operative position, the belt 44 extends around a drive pulley 46. If a cartridge having no aperture for the reel mandrel 9 is fitted into the appliance, the reel mandrel is axially displaced against the action of the spring 43 so that the belt 44 is moved onto an idler pulley 47 and the drive to the reel mandrel 9 is cut off as

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soon as the belt 44 reaches its inoperative position. The position of the reel mandrel 9 is sensed by a sensing lever 48, which is urged by a spring 49 into engagement with a disc 50, at the free end of the support shaft of the reel mandrel 9. The sensing lever 48 is rigid with a shaft 51 to which a locking lever 52 is secured, the lever 52 extending into the path of a locking cam 53 when the reel mandrel 9 is in its operative position. The locking cam 53 is connected to one end of a hollow shaft 54, which, at its other end, carries the pivoted arm 6 on which the friction wheel 5 is mounted. Through a drive shaft 55, which is coaxial with the hollow shaft 54, the friction wheel 5 is driven by drive wheels, which are mounted inside the pivoted arm 6. An arm 56 is connected to the hollow shaft 54 and biased by a spring 57. When the locking lever 52 extends into the path of the locking cam 53, the spring 57 cannot rotate the hollow shaft 54. Upon axial displacement of the reel mandrel 9 to its inoperative position, the sensing lever 48 and the locking lever 52 are pivotally moved in a counterclockwise sense so that the hollow shaft 54 and the pivoted arm 6 are released for a rotation under the action of the spring 57.

It will be understood by a person skilled in the art that different means may be used to disable the means for driving the reel mandrel and that such different means may comprise, e.g., a jaw clutch or an electric switch which is operated by the movement of the reel mandrel. Furthermore, different means may be used to lock the two drive members 9 and 5.

In the embodiment shown in Figure 7, the different cartridges are secured in one and the same area, in a carriage 58, and drive units for driving cartridges of different types are provided in different stations providing locating assemblies. In the embodiment shown by way of example, the carriage 58 is movable from its inoperative position, shown in the drawing, along a rail 59 to the different stations arranged one behind the other. The rail 59 is mounted in a recess in the wall of the projector 1. A displacement to the left moves the carriage 58 first to a position adjacent to the drive unit formed by the mandrel 9. If a cartridge 3 is contained in the carriage 58, the sensing pin 26 will fall into the aperture 24 (see Figure 3) in the cartridge 3 so that the carriage 58 is also locked in the correct position. If a cartridge 2 having no aperture 24 is contained in the carriage 58, the sensing pin 26 will be depressed so that the carriage 58 can move as far as to the drive unit formed by the friction wheel 5. The carriage 58 need not be moved from an inoperative position to different drive stations but may be movable between the driving station which is associated with the friction

wheel 5 and the driving station which is associated with the reel mandrel 9.

In moving to the drive stations, the carriage 58 moves in succession over two push buttons 60, 61 for respective switches 60a, 61a, by which the proper drive unit 5 or 9 is energized. The corresponding circuit diagram is shown in Figure 8. The appliance is energized for its various functions by a main switch 62. A normally closed switch 26a is included in the circuit and connected to the sensing pin 26. When the carriage 58 is loaded with a cartridge 3 and displaced to the left in Figure 7, the sensing pin 26 falls into the aperture of the cartridge 3 and holds the switch 26a closed. The switch 60a is closed at the same time by the pushbutton 60. The reel mandrel 9 is now ready for operation.

When the carriage 58 is loaded with a cartridge 2, the switch 60a is closed by the pushbutton 60 and the switch 26a is open. The means for driving the reel mandrel 9 cannot be energized when the carriage 58 is in this position. Only when the carriage 58 reaches the position associated with the cartridge 2 is the switch 61a closed by the pushbutton 61 so that the means for driving the friction wheel 5 are ready for operation.

In the embodiment shown in Figure 9, the locating assemblies fixing the cartridges 2a, 3a are provided in different areas of the appliance. The cartridges 2a, 3a lie one behind the other with mutually facing end faces. A suitable feed-out device 63 or 64 is associated with each type of cartridge. Means are provided, not shown, for guiding film which has been threaded out of the cartridge 2a or 3a to a common lens or a common film gate 65. A separate mode control switch I or II is provided for cartridges of each type.

Figures 10 and 11 show a projector in which locating assemblies for fixing cartridges of different types are provided in different areas, which are disposed one beside the other. A stripper 68, which is pivotally movable about a pivot 67, which may be stationary, and a film feed-out device 69, are provided for cartridges 3a, which are fitted on a reel mandrel 9, which is mounted on a reel-carrying arm 66. A stripper 70 and a film feed-out device 71 are provided for cartridges 2a. A simpler arrangement regarding the feed-out devices is shown in Figure 12. The two feed-out devices 72 and 73 are similar and mounted on a common operating lever 74, which is pivotally movable about a pivot 75 by pressure applied to a pushbutton 76. Because the devices 72 and 73 are similar, they must be designed so that each device can be used with cartridges of both types. An advantage resides in that a single actuating mechanism and a single drive means are required for both feed-out devices 72, 73. It will not be detrimental if the device 73 is

also driven when the 72 is used and vice versa.

The embodiment shown in Figure 13 comprises only a single feed-out device 77 for cartridges of both types. The device 77 is may be moved by a cam mechanism (not shown) to the cartridge 2 or 3. The cam mechanism might consist of suitable shaped cam wheels but in the embodiment shown by way of example comprises a cam slot 78, which is designed so that the device 77 is moved to the extraction opening of the respective cartridge 2 or 3. It will be understood that such a simple cam slot 78 may be used only for cartridges of two types. The feed-out devices which are shown, such as the device 77, cannot only be displaced into and out of the opening of the cartridge but can also be moved axially so that the stripper is moved out of the path of the film when it has been fed out. This arrangement will prevent damage to the film by frictional contact with parts of the feed-out device.

In the embodiment shown, a pinion 79 is connected to the drive shaft of the feed-out device 77. By a spring, not shown, the threading device 717 is normally held in a position facing the cartridge 3. By means of the pinion 79 the feed-out device can be moved against the action of said spring to the position from which it can be introduced into the cartridge 2. In projectors which are controlled by a programme control system, this operation may be accomplished, e.g., in such a manner that when a cartridge 3 is used the starting of the projector initiates immediately the feed-out operation whereas when a cartridge 2 is used an additional programme is initiated which causes a rotation of the feed-out device 77 by means of the pinion 79.

Another control arrangement for a feed-out device is shown in Figure 14 and is substantially similar to the arrangement shown in Figures 10 and 11. Cam slots 80, 81 which merge into a common slot 82 are provided to guide a feed-out device. A deflector 83 is provided between the cam slots 80 and 81 and pivoted on a pivot pin 84. Two sensing members 85, 86 engage the top of the deflector 83 and in response to the application of a cartridge 2 or 3 move the deflector to one position or the other. One of the sensing members 85 and 86 may be replaced by a spring 87, which normally holds the deflector 83 in a given position, in which, e.g., the cam slot 80 is exposed. In this case, the sensing element 86 may be omitted and the deflector will be pivotally moved to expose the cam slot 81 only when the sensing member 85 is operated by the application of a cartridge 3.

In the embodiment shown in Figure 14, the lens of the projector is desirably disposed in the middle between the two cartridges indicated at 2 and 3. This may result in a

difficulty in that the film which has been moved out of the cartridge must be offset transversely to its longitudinal edge. This difficulty may be eliminated by mounting the cartridges 2 and 3 on a carriage which can be centred over the lens. Another arrangement is shown in Figure 15, where the cartridges of different types converge toward their exit openings and a single feed-out device 88 is shown for cartridges 2, 3 of different types. The device 88 is mounted on an actuating lever 89, which is pivotally movable through an angle which is equal to the angle α included by the centre lines 90, 91 of the cartridges 2, 3. The device 88 is preferably disposed approximately at the intersection of the two centre planes 90, 91 so that a small angle is sufficient for the pivotal movement of the actuating lever 89 and the feed-out device 88.

It is shown in Figure 9 that different mode control switches I and II may be associated with locating assemblies disposed in different areas and used to fix cartridges of different types. To prevent an improper operation of these switches I and II, they are normally locked by means shown in Figures 16 and 17. In the embodiment shown by way of example, these means comprise a detent rod 92, which in the zero position of the two switches I and II is in register with a notch 93 in a disc 94 and the position of which is controlled by a sensing device. The sensing device comprises a sensing member 96, which is displaceable against the action of a spring 95 and operated by the wall of a cartridge 2 or 3 as the cartridge is inserted. The sensing member 96 comprises a bevelled surface 97, which co-operates with the detent rod 92. When no cartridge is fitted into the projector, the inside surface of a slot 98 provided in the detent rod 92 near one end thereof engages the sensing member 96 and the other end of the detent rod 92 engages the notch 93 in the discs 94. The disc 94 is mounted on the shaft of the mode control switch I, so that the latter is normally locked. As a cartridge 2 or 3 is applied to the appliance in the proper area, the sensing member 96 is displaced to the left in Figure 17 and the bevelled surface 97 displaces the detent rod 92 to release the mode control switch I. A device which is similar to that described for the mode control switch I is provided also for the mode control switch II.

Figure 18 shows an embodiment in which the sensing member 96 operates a switch, which normally activates the mode control switch I. In this case, the sensing member 96 is disposed only adjacent to the cartridges 3. Only if a cartridge 3 is fitted into the projector is the sensing member 96 actuated to shift the switch 99 to a position enabling the mode control switch II to operate.

The use of two different mode control

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switches for two different fixing areas of the apparatus is not essential. Figure 19 shows a single mode control switch, which may be used to start one drive means and the other. For this purpose, the mode control switch 100 is rotated in direction I or direction II. To prevent incorrect operation of the mode control switch 100, locking pawls 101, 102 are provided, which cooperate with respective ratchet wheels 104, 103. The locking pawl 101, 102 are controlled by the sensing members 96 through tension cords or the like 105, 106 and ensure that the mode control switch 100 can be rotated in direction I or II only if a cartridge 2 or 3, respectively, is applied to the apparatus. The actuating handle of the mode control switch 100 may be axially displaceable for a return of the switch 100 to its zero position. Such return may alternatively be enabled by a means for disengaging the pawls 101 or 102.

Only two different drive stations can be controlled by the mode control switch 100 which is shown. In an apparatus for use with cartridges of a larger number of types, the mode control switch would have to be axially displaceable and rotatable.

Figure 20 shows an embodiment which comprises either of two different insert structures 107 and 108 for cartridges of different types. Each of said insert structures comprises means 109 or 110 for fixing cartridges of the respective type. To prevent confusion, the projector is provided with different polarising connectors 111 and 112 for the insert structures 107 and 108, respectively. In the embodiment shown by way of example, the connectors 111, 112 comprise connector pins carried by the projector although such pins may alternatively be carried by the insert structures. In the latter case, the connector pins may cooperate with sensing means to enable the respective reel-driving means or the like. Because the pins of the connectors 111 and 112 are spaced different distances apart, the apertures for receiving said pins may be provided in the projector in one and the same area if the pins are provided on the inserts 107 and 108. This arrangement would be similar to that shown in Figures 1 and 2. Similarly, the projector could be designed as shown in Figure 20 and a single insert structure could be provided which carries the fixing means 109 and the fixing means 110.

In the embodiment shown in Figures 21 to 23, the projector 1 comprises a base structure 12 connected to an attachment 13. The latter carries fixing means, not shown, for cartridges 114a or 114b of a given type. The attachment 13 has a feed-out device which is specially designed for use with the cartridges 114a, 114b and which includes a stripper 68 and a driven extractor device 69. In Figure 21, the stripper 68 is shown broken away to illustrate the transmission disposed

below the stripper. The attachment 13 includes a belt drive comprising a belt 107 driving a pulley 108, which is mounted on the pivot 109 of the reel-carrying arm 11. At its other end, the arm carries the mandrel 9 for the reel disposed in cartridge 114a or 114b. The reel mandrel 9 is driven from the pulley 108 by means which are not shown. The belt 107 is driven by a friction wheel 124, which has a shaft 113 that is mounted in a projection of a housing which encloses the attachment 13. Behind the friction wheel 124, the shaft 113 carries a belt pulley driving the belt 107. Pins 114, 115 are connected to the attachment 13 and enter holes provided in the housing of the base structure 12 so that the attachment of the apparatus is centred on the base structure 12.

The attachment 13 of the appliance 1 comprises that portion of the appliance which has been described. The base structure 12 accommodates the remaining part of the appliance. Of said remaining part, Figure 21 shows only a clutch 116 and the means for driving the spindle 117 for the take-up reel of the projector 1.

The clutch 116 comprises a driving friction wheel 118, which drives the friction wheel 124 of the attachment 13. The friction wheel 124 drives a further friction wheel 119 for a drive belt 120, which is trained over a deflecting pulley 121, which is mounted in a projection of the housing of the base structure 12. The driving wheel 118 drives also a friction wheel 122, which in turn drives the extractor 69.

Figure 22 shows an embodiment which comprises a base structure 12 and another attachment 123, which is intended for use with cartridges 20 of a type which differs from cartridges 114a, 114b. The attachment 123 comprises a feed-out device which is particularly suitable for use with cartridges 2a and which includes a stripper 125 and a driven extractor drive 126. Instead of the reel mandrel 9 provided in the attachment 13, the attachment 123 has a friction wheel 127, which is carried by an arm 129, which is pivoted on a pivot 128. A belt 130 is provided to drive the friction wheel 127 and drives a pulley 131, which is mounted on the pivot 128 and by means of another belt 132 drives a belt pulley 133. The belt 130 is again driven by a belt pulley which is mounted on the same shaft as a friction wheel 134. This friction wheel 134 corresponds to the friction wheel 124 of the attachment 13. For the sake of clearness, only the driving wheel 118 of the clutch 116 of the base structure 12 is shown in Figure 22; Figure 22 shows also an actuating rod 135, which is mounted in the base structure 12 of the projector 1 and protrudes from the housing of that base structure into the housing of the attachment 123. The actuating rod 135 may

be used to impart a pivotal movement to the arm 129 so that the friction wheel 127 can enter the cartridge 2a through an opening in the end of the cartridge 2a and can then engage a flange of the reel in said cartridge to drive said reel.

Another friction wheel 136 is provided in the base structure 12 of the appliance 1 and serves to drive the feed-out device 125, 126. When the attachment 123 is attached to the base structure 12 of the appliance 1, the friction wheel 136 engages a friction wheel 137, which is mounted in the attachment 123. The feed-out device 125, 126 is carried by an actuating lever 138, which is pivotally movable about a pivot 139 in response to pressure applied to a sensing member 140. A belt pulley 141 is mounted on the pivot 139 and is driven from wheel 137 by a belt 142. A driving wheel 143 of the extractor drive 126 is driven from the belt pulley 141 by means of a belt 144, which is trained over a deflecting pulley 145 mounted on the actuating lever 138.

The attachment 123 comprises pins 146, 147 which correspond to the pins 114, 115 of the attachment 13. Furthermore, Figure 22 shows a projection 148 of the housing of the base structure 12; that projection extends into a suitable recess in the housing of the attachment 123 and serves also to centre the attachment.

Figure 23 shows the top of another base structure 149 of an apparatus according to the invention. That apparatus is provided with quick-acting connecting means 150, which cooperate with complementary means provided on the attachment and enable quick separation and attachment of the attachment from and to the base structure of the appliance. The base structure 149 of the appliance is accommodated in a housing which surrounds the base structure not only on the outside but also closes the same at the top by a top wall 151. In this way, the means in the housing are protected against being soiled and damaged in storage and shipment. For improving centering, the top of the housing of the base structure 149 comprises a box-like top extension 152, which has walls which are somewhat inclined inwardly and tend to centre the attachment as it is applied to the base structure 149.

A take-off shaft 154 extends through an aperture 153 in the wall 151 and serves to transmit power from the base structure 149 of the appliance to attachments. The take-off shaft 154 is provided at its free end with a quick-acting coupling 155, which in the embodiment shown by way of example consists of a spigot and socket coupling and which has a central quadrangular socket 156 with energising side faces so that this coupling is self-centering. The extension 152 has such a height that it protrudes over the shaft

154 and the coupling 155 and assists in preventing damage to the shaft 154. The same remark is applicable to the actuating rod 158 extending through an aperture 157 in the wall 151 and corresponding to the actuating rod 135 in Figure 22. For reliable guidance of the take-off shaft 154 and the actuating rod 158, bearings for the shaft 154 and rod 158 are provided at the apertures 153 and 157. Of these bearings, only a bearing 159 for the take-off shaft 154 is shown.

Figures 24 and 25 show a different arrangement, which accomplishes the same object as the arrangement shown in Figures 4 and 5. Two cartridges 2 and 3 of different types, namely, Type A and Type B, are located by locating assemblies, not shown, in such a manner that the lower right corner of all cartridges will be at the same point whereas the locations of the reel centres will differ greatly. In the drawing, the positions of the reel centres of Type A cartridges are indicated at A₁ to A₄. A₁ is the position of the centre of a cartridge for 15 meters of film, A₂ the position of the centre of a cartridge for 30 meters of film, A₃ the position of the centre of a cartridge for 60 meters of film and A₄ the position of the centre of a cartridge for 120 meters of film. The positions of the centres of Type B cartridges are indicated at B₁ to B₄. It will be apparent that the centres of the large cartridges are so widely spaced that a common pivot for the lever which carries the feed-out device could not be located at such a point that an optimum path for the feed-out device will be obtained. To avoid these difficulties, the lever 207 which carries the feed-out device is not mounted on a stationary pivot but on a pivoted lever 208. A two-armed lever element 214 is provided to shift the feed-out device and is pivoted on the pivotal axis 215 of lever 208. The lever 214 carries a member 216 at one end and at the other end bears on the lever 207 by means of an interposed spring 217. A spring 218 urges the lever 208 to its inoperative position shown in solid lines in Figure 24. A finger catch 219 formed in the lever 214 cooperates with a detent or pawl 220, which is biased by a spring 221 and controlled by means of a push rod 222 from the arm 223 which guides the film to the take-up reel 212. Depression of the member 216 causes the lever 214 to interlock with the pawl 220 holding the lever 214 in operative position, indicated in dotted lines in Figure 24. The spring 217 bears on the lever 207 and tends to impart a pivotal movement thereto in the counterclockwise sense. The spring 224 which is secured to the lever 207 and to the lever 208 transmits said pivotal movement to the lever 208 so that the centre 225 of the deflecting roller 226 of the belt drive 225 describes a path defined by an arc of a circle α . This shift of the feed-

ing device will be induced by the application of a Type A cartridge.

A stop 227 is disposed adjacent to the lever 208 and guided on a shaft 228 parallel to the pivotal axis 215 of the lever 208. By means of a knob 229, the stop can be axially moved into and out of the plane of the lever 208. When a Type B cartridge is used, the knob 229 is shifted to move the stop 227 into the plane of the lever 208. An operation of the member 216 imparts a pivotal movement to the lever 207 as described hereinbefore. This pivotal movement will be transmitted by the spring 224 to the lever 208 until the latter engages the stop 227 and can no longer follow the movement of the lever 207. The latter is now pivotally moved about the axis 230 and imparts to the centre 225 of the pulley 226 for the friction belt a movement along an arc of a circle. That arc is indicated at *b* and optimally approaches the centres of the reels for Type B cartridges.

As soon as the feeding-out operation has been completed and the leading end of the film has reached the take-up reel 212 and is being wound up on the same, the tensioned film acts on the film-guiding arm 223 and tends to impart to said arm a pivotal movement in the counterclockwise sense so that the pawl 220 is lowered to release the two-armed lever 214, which is now returned by the spring 218 to its inoperative position. The levers 207 and 208 are now moved in a clockwise sense so that the stop 231 carried by the lever 207 finally engages the lever 208. Now the feed-out mechanisms are again in their inoperative position shown in solid lines in Figure 24. The film-guiding arm 223 associated with the take-up reel 212 is controlled by means of the mode control switch 213, which has a shaft that carries a cam 232, which by means of a push rod 233 imparts a pivotal movement to the film-guiding arm 223. The belt drive 205 of the threading device is driven by a driving belt 234, which is deflected by a pulley 235 mounted on the common pivot of levers 207 and 208.

Figure 25 shows two modifications of the apparatus just described. A main difference concerns the means for shifting the feed-out device. The pivot 215 for the lever 208 carries a gear 236, which is belt connected to a grooved pulley 235, around which the belt 234 which serves to drive the feed-out device is trained. The gear 236 is in mesh with an idler gear 237, which is mounted on a pivoted plate 238, which is biased in a counterclockwise sense by a spring 239 to hold the gear 237 in mesh with a gear 240. The gear 240 is mounted on a stationary axis and is driven in a counterclockwise sense by the drive motor, not shown, of the apparatus. An extension 241 of the plate 238 bears on a bell-crank lever 242, which carries a pushbutton

243 and which is held by a spring 244 in the position shown in solid lines in Figure 25. An extension or catch 245 of the bell-crank lever is in register with a pivoted detent or pawl 246, which is biased by a spring 247 and which like the pawl 220 in the embodiment of Figure 24 is controlled by the film-guiding arm 223 associated with the take-up reel. To initiate the feed-out operation, the pushbutton 243 is depressed so that the catch of the bell-crank lever 242 interlocks with the pawl 246, the pivoted plate 238 is released and the idler gear 237 is swung in the counterclockwise sense into engagement with the gear 240. The gear 240 is now operatively connected to the gear 236. A one-armed lever 249 is pivoted to the shaft 215. A friction clutch 248 is provided between the gear 236 and the one-armed lever 249. As soon as the operative connection to the friction wheel 236 has been established, the friction clutch 248 imparts to the lever 249 a movement in the counterclockwise sense. The lever 249 bears on the lever 207 and imparts to the latter and to the lever 208 a pivotal movement in the counterclockwise sense. If the stop 227 is disposed in the plane of the lever 208, the centre 225 of the wheel 226 describes the path *a*.

Figure 25 illustrates another modification of the means controlling the feed-out device. The bell-crank lever 242 may be replaced by a push rod 250, which engages the pivoted plate 238 and which is controlled by a cam mounted on the shaft of the mode control switch. In other respects the feed-out device has the function described hereinbefore.

Other embodiments may be adopted. For instance, the stop 227 may be controlled by a sensing member, which cooperates with surfaces that are provided on cartridges and typical of the type of cartridge so that the stop 227 is retracted from the plane of the lever 208 as a Type A cartridge is applied.

The projector 1 shown in Figures 26 to 29 has locating assemblies for locating and fixing Type A and Type B cartridges. These include a rib 302, which is rigid with the appliance and which cooperates with complementary stops carried by the cartridges and takes up the forces which are transmitted to the cartridge during the operation of the reel therein. A friction wheel 5 is provided to drive a film reel 303 disposed in a Type A cartridge 2 and can be pivotally moved into the cartridge 2 through an opening 205 in the housing of said cartridge. The walls of a Type B cartridge 3 are provided with apertures 308, 309, which are coaxial with the reel and through which the reel mandrel 9 can be inserted. In this case, the reel mandrel 9 is detachably mounted on the projector 1 and is removed when a Type A cartridge is to be used.

The rib 302 which is rigid with the appli-

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125

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ance cooperates with stops 319 that are provided on cartridges of both types. The remaining locating means are specific to each type of cartridge. The locating assembly which serves only for locating Type A cartridges comprise a plate 311, which is pivoted on a shaft 312, which is rigid with the appliance. The offset plate 311 carries two upwardly directed extensions 313 and 314, which are in register with corresponding apertures 315 and 316 in the cartridge. A spring 317 biases the plate 311 against a stop 318 to hold the plate 311 in an operative position. The cartridges 2 are fitted into the appliance from above in a slightly inclined direction and are aligned on the appliance by the extensions 313, 314 and corresponding apertures 315, 316 in the cartridge. The stop 319 of the cartridge engages the rib 302 which is rigid with the apparatus. A Type B cartridge has to be fitted in the direction of the axis of the reel mandrel 9. In this case, the wall of the cartridge strikes against the extensions 313 and 314 so that a pivotal movement to the rear about the shaft 312 is imparted to the plate 311 (see Figures 28 and 29). The locating assembly comprise a lever 321, which is pivoted on shaft 320 and carries a pin 322, which is parallel to the axis of shaft 320. A spring 323 biases the lever 321 in the counterclockwise sense against a pin 325, which is rigid with the projector. Type B cartridges are provided adjacent to the pin 322 with an aperture 324, which in conjunction with the pin 322 ensures an alignment of the cartridge on the appliance. As a Type A cartridge is mounted, the cartridge wall strikes on the pin 322 and imparts to the latter and to the lever 321 a pivotal movement in the clockwise sense in Figures 26 and 27. This will ensure that an application of a cartridge of one type will move the locating assembly for locating cartridges of the other type to an inoperative position. It will also be ensured that the locating assembly for locating a cartridge of a given type cannot yield so that they will hold the cartridge exactly in position.

In the arrangement shown in Figures 30, 31, a lever 405 carries a friction belt drive 403 and a stripper 404. The lever 405 is mounted on a stationary axis in the appliance and corresponds, e.g., to the levers 207, 208 of Figures 24, 25. The belt drive 403 is driven by a belt 406. The stripper 404 is displaceably mounted and is biased upwardly by a spring 415. For this purpose, the lever 405 carries a U-shaped member 412, on which the stripper 404 is slidably guided. The displacement of the stripper 404 is limited by a stop, not shown. A lever 413 is pivoted to the U-shaped member 412 and is biased by a spring 414 tending to impart to the lever 413 a pivotal movement in the clockwise sense to the position shown in

solid lines in Figure 30. The cartridge 2 is provided at its base and in its right-hand side wall with an opening through which the belt drive 403 and the stripper 404 can be inserted into the cartridge. In the zone designated 416, the opening of the cartridge is wider than the film whereas the opening has a smaller width in the zone 417, where only the belt drive can be introduced and the film cannot be moved out of the cartridge in this zone. To thread the leading end of the film out of the cartridge, the lever 405 is swung upwardly so that initially the stripper 404 engages the film roll 407. The stripper 404 is then pushed back against the action of the spring 415 until the belt drive 403 engages the film roll (this position is indicated in dotted lines in Figure 30). As the stripper 404 is moved into the cartridge, the lever 413 strikes against the wall of the cartridge and is swung down to close the free opening between the cartridge and the stripper for the film.

Figure 31 shows the threading device of the appliance loaded with a Type B cartridge 3. This cartridge differs substantially from Type A cartridges in that it is open not only at the bottom but also at both side walls. Furthermore, the zone 416 in which the opening is wider than the film is much larger. As the threading device is moved into the cartridge, the lever 413 remains substantially in its initial position so that a leading end of the film when disposed behind the stripper in the clockwise sense will be deflected toward the inside wall of the cartridge and cannot emerge therefrom behind the stripper. When the roll of film has rotated through about 270°, the leading end of the film reaches the belt drive 403 and is moved between the latter and the film roll 407 and finally stripped off by the film stripper 404 to move out of the cartridge in the passage defined between the stripper 404 and the belt drive 403. With the same advantages, this design may be used in appliances for use with cartridges of only one type. In this case too, closing of the free openings of the cartridge during the feed-out operation will be desirable and will considerably improve the reliability of the appliance in operation. These free openings are indispensable for reasons of tolerance.

Figures 32 to 34 show an arrangement which has been described in part in connection with Figures 26 to 31. Corresponding parts carry the same reference characters as in the above mentioned Figures. The embodiment shown in Figures 32 to 34 differs from that of Figures 26 to 31 mainly in the provision of a cartridge selector switch 515 at the top of the apparatus.

The cartridge selector switch 515 is mounted on a shaft 516 to be pivotally movable and axially displaceable. The switch

515 is guided by an aperture 517 of the projector housing. The aperture 517 comprises a long slot 517a, which is normal to the axis of shaft 516. A spring 518 tends to move the selector switch 515 in the clockwise sense. The selector switch 515 is connected to the lever 6, which at its free end carries the friction wheel 5. This friction wheel is driven through a belt drive 521 (Figure 33) and through additional drive means, which are not shown. The lever 6 carries also an extension 520, which is in register with a push rod 522 and with the plate 311, which is pivoted on a pivot 312. The push rod 522 is provided with slots 525, 526, with which the rod is guided on stationary pins 527, 528. The push rod 522 is forced by a spring 529 against a cam 530, which is mounted on the shaft of the mode control switch 213. When the switch 213 is rotated in the counterclockwise sense from the position shown in Figure 32, the push rod 522 will fall into the recess 531 of the cam 530 to release the lever 6. If the selector switch 515 is in the position shown in solid lines in Figure 33, the spring 518 will impart to the lever 6 a pivotal movement in the clockwise sense until the friction wheel 5 engages the periphery of the flange of the film supply reel. The operation of the friction wheel 5 is initiated at the same time so that the film supply reel is driven in the clockwise sense at high speed and the film is rewound on said reel. If the selector switch 515 was in the position indicated in dash-dot lines in Figure 33, the spring 518 can pivotally move the switch 515 only through a small angle because the slot 517 has only a small depth and the friction wheel 5 is locked in its inoperative position when the selector switch 515 is in this position. In a desirable embodiment of the invention, the extension 520 of the lever 6 now engages the plate 311 so that an axial displacement of the switch 515 will impart to the plate 311 a pivotal movement out of the path of the cartridge against the force of a spring 317. In this position of the selector switch 515, cartridges of the second type can be applied. When the cartridges of that type are applied to the appliance in the direction of the arrow 537 in Figure 34 and the selector switch 515 is in the position indicated in solid lines in Figure 33, the side wall of the cartridge will strike against the extensions 313 and 314 of the plate 311 and will pivotally move the latter to the rear. In another embodiment of the invention, this shift may be utilized for a direct operation of the cartridge selector switch in response to the application of a cartridge of one type or another. In this case, it will be sufficient to provide a positive connection between the plate 311 and the cartridge selector switch. Another cam 538 is mounted on the shaft of the mode control switch 213 and in

register with a push rod 539. The latter has at one end a slot 540, which is guided on a stationary pin 541, and at the other end is pivoted to a crank 542, which is pivoted on a shaft 543. A spring 544 biases the push rod 539 against the cam 538. A gear 545 is mounted on the crank 542 and in mesh with a gear 546, which is rotatably mounted on the shaft 543. The gear 546 is connected to a pulley 547, around which the drive belt 406 is trained, which drives the belt drive 403. The gear 545 is also in register with a gear 548, which is mounted on a stationary axis and which is constantly driven by the drive motor of the apparatus. A pivotal movement of the mode control switch 213 in the clockwise sense causes the push rod 539 to enter the recess 549 of the cam 538. As a result, the crank 542 is pivotally moved in the counterclockwise sense until the gear 545 establishes an operative connection between the gear 548 and the gear 546. The drive belt 406 can now drive the belt drive 403. By means of the friction clutch 550, which is diagrammatically shown, the gear 546 drives also the lever 405 in the counterclockwise sense to move the belt drive 403 and the stripper 404 into the cartridge through the opening 416 in the base thereof. When the feed-out operation has been completed, the mode control switch 213 is rotated one step in the clockwise sense so that the push rod 539 is lifted out of the recess 549 of the cam 538. The operative connection to the gear 546 is thus interrupted so that the belt drive is arrested and a spring, not shown, returns the lever 405 to its initial position.

WHAT WE CLAIM IS:—

1. Apparatus for use with different types of reel cartridges in one of which the reel is peripherally driven and in the other of which the reel is center driven, and providing a common path leading to a take-up reel position and along which strip, unwound from a cartridge when in use, is guided past a strip-information-handling station, such apparatus including: cartridge locating surfaces for locating each of the cartridge types in its operating position; a first drive unit for peripherally driving said one cartridge, when in its operating position; a second drive unit for center-driving said other cartridge, when in its operating position; and, feed-out means for exacting a leading end of the strip from a cartridge to be used, when the cartridge reel is driven by its drive unit in the strip unwinding direction, and for feeding such leading end into the common path for onward movement past said station to the take-up reel.

2. Apparatus as claimed in claim 1, in which said cartridge locating surfaces provide a first assembly for locating said one



515 is guided by an aperture 517 of the projector housing. The aperture 517 comprises a long slot 517a, which is normal to the axis of shaft 516. A spring 518 tends to move the selector switch 515 in the clockwise sense. The selector switch 515 is connected to the lever 6, which at its free end carries the friction wheel 5. This friction wheel is driven through a belt drive 521 (Figure 33) and through additional drive means, which are not shown. The lever 6 carries also an extension 520, which is in register with a push rod 522 and with the plate 311, which is pivoted on a pivot 312. The push rod 522 is provided with slots 525, 526, with which the rod is guided on stationary pins 527, 528. The push rod 522 is forced by a spring 529 against a cam 530, which is mounted on the shaft of the mode control switch 213. When the switch 213 is rotated in the counterclockwise sense from the position shown in Figure 32, the push rod 522 will fall into the recess 531 of the cam 530 to release the lever 6. If the selector switch 515 is in the position shown in solid lines in Figure 33, the spring 518 will impart to the lever 6 a pivotal movement in the clockwise sense until the friction wheel 5 engages the periphery of the flange of the film supply reel. The operation of the friction wheel 5 is initiated at the same time so that the film supply reel is driven in the clockwise sense at high speed and the film is rewound on said reel. If the selector switch 515 was in the position indicated in dash-dot lines in Figure 33, the spring 518 can pivotally move the switch 515 only through a small angle because the slot 517 has only a small depth and the friction wheel 5 is locked in its inoperative position when the selector switch 515 is in this position. In a desirable embodiment of the invention, the extension 520 of the lever 6 now engages the plate 311 so that an axial displacement of the switch 515 will impart to the plate 311 a pivotal movement out of the path of the cartridge against the force of a spring 317. In this position of the selector switch 515, cartridges of the second type can be applied. When the cartridges of that type are applied to the appliance in the direction of the arrow 537 in Figure 34 and the selector switch 515 is in the position indicated in solid lines in Figure 33, the side wall of the cartridge will strike against the extensions 313 and 314 of the plate 311 and will pivotally move the latter to the rear. In another embodiment of the invention, this shift may be utilized for a direct operation of the cartridge selector switch in response to the application of a cartridge of one type or another. In this case, it will be sufficient to provide a positive connection between the plate 311 and the cartridge selector switch.

Another cam 538 is mounted on the shaft of the mode control switch 213 and in

register with a push rod 539. The latter has at one end a slot 540, which is guided on a stationary pin 541, and at the other end is pivoted to a crank 542, which is pivoted on a shaft 543. A spring 544 biases the push rod 539 against the cam 538. A gear 545 is mounted on the crank 542 and in mesh with a gear 546, which is rotatably mounted on the shaft 543. The gear 546 is connected to a pulley 547, around which the drive belt 406 is trained, which drives the belt drive 403. The gear 545 is also in register with a gear 548, which is mounted on a stationary axis and which is constantly driven by the drive motor of the apparatus. A pivotal movement of the mode control switch 213 in the clockwise sense causes the push rod 539 to enter the recess 549 of the cam 538. As a result, the crank 542 is pivotally moved in the counterclockwise sense until the gear 545 establishes an operative connection between the gear 548 and the gear 546. The drive belt 406 can now drive the belt drive 403. By means of the friction clutch 550, which is diagrammatically shown, the gear 546 drives also the lever 405 in the counterclockwise sense to move the belt drive 403 and the stripper 404 into the cartridge through the opening 416 in the base thereof. When the feed-out operation has been completed, the mode control switch 213 is rotated one step in the clockwise sense so that the push rod 539 is lifted out of the recess 549 of the cam 538. The operative connection to the gear 546 is thus interrupted so that the belt drive is arrested and a spring, not shown, returns the lever 405 to its initial position.

WHAT WE CLAIM IS:—

1. Apparatus for use with different types of reel cartridges in one of which the reel is peripherally driven and in the other of which the reel is center driven, and providing a common path leading to a take-up reel position and along which strip, unwound from a cartridge when in use, is guided past a strip-information-handling station, such apparatus including: cartridge locating surfaces for locating each of the cartridge types in its operating position; a first drive unit for peripherally driving said one cartridge, when in its operating position; a second drive unit for center-driving said other cartridge, when in its operating position; and, feed-out means for exacting a leading end of the strip from a cartridge to be used, when the cartridge reel is driven by its drive unit in the strip unwinding direction, and for feeding such leading end into the common path for on-ward movement past said station to the take-up reel.

2. Apparatus as claimed in claim 1, in which said cartridge locating surfaces provide a first assembly for locating said one

cartridge in its operating position and a second assembly for locating said other cartridge in its operating position.

3. Apparatus as claimed in claim 2, constructed as a motion picture projection apparatus and having motion picture projection equipment at said station.

4. Apparatus as claimed in claim 2, or claim 3 in which both drive units are driven by the same drive.

5. Apparatus as claimed in claim 4, in which the drive is provided by a motor mounted in a base, and first and second assemblies are respectively provided on two attachments each of which can be fitted to a common mounting position on the base, each attachment being provided with a drive unit and a feed-out device appropriate to the cartridge type it is to accommodate, and with drive connections which are released by separation of the attachment from the base and through which drive is transmitted from the motor to the drive unit and feed-out device.

6. Apparatus as claimed in claim 5, in which the drive connections include parts which are frictionally driven by cooperating parts on the base.

7. Apparatus as claimed in claim 5, in which the drive connections between the base and the attachments include a self-centering coupling.

8. Apparatus as claimed in claim 5, claim 6 or claim 7, in which manually releasable clips secure the attachments to the base, and correct location of each attachment on the base is assisted by a rim flange on one co-operating with a mating surface on the other.

9. Apparatus as claimed in claim 8, in which the rim flange is provided on the base.

10. Apparatus as claimed in any one of claims 5 to 9, in which a mode control switch, the take-up reel position, the common path and the information-handling station are all provided on the base.

11. Apparatus as claimed in any one of the preceding claims, in which a feed-out device of said means and for use with said one cartridge is mounted at one end of a pivoted arm along which extends a drive belt looped around two pulleys one of which turns about the pivotal axis of the arm and is driven while the other pulley forms part of the feed-out device.

12. Apparatus as claimed in claim 11, in which the arm has two sections pivoted to one another and held in relative positions by a spring, a stop limiting pivotal movement of the first arm-portion adjacent said pivotal axis, and a resilient member acting on the second arm-portion to move the arm to a position at which the feed-out device is in its working position, such movement

being accompanied by articulation of the arm against the bias of the spring and after said one arm-portion has engaged the stop.

13. Apparatus as claimed in claim 11 or claim 12, in which an operating spring having an associated spring-stressing element is adapted to hold the arm in the working position of the feed-out device until a mechanism, responsive to strip tension at the take-up reel, is tripped by such tension to release the strip-stressing element and allow a restoring spring to return the arm to its operative position.

14. Apparatus as claimed in claim 11, claim 12 or claim 13, in which a manually operable lever is movable against a spring bias to displace the arm to the working position of the feed-out device.

15. Apparatus as claimed in claim 11, claim 12 or claim 13, in which the arm is urged to its inoperative position by a spring and is resiliently urged towards its operating position by a second arm turned about a pivot by a drive transmitted through a friction clutch which slips when the arm is in its operative position.

16. Apparatus as claimed in claim 15, in which drive is transmitted through an arcuately movable intermediate gear to the friction clutch, the gear being urged by a drive spring to a drive position at which it meshes with a driven gear, and being held by a disengageable spring-loaded element away from the drive position when operation of the feed-out device is not required.

17. Apparatus as claimed in claim 16, in which the spring-loaded element has a catch co-operating, when the element is disengaged, with a pawl responsive to a mechanism which senses strip tension at the take-up reel, the pawl engaging the catch to hold the element inoperative during feed-out of the strip from the cartridge and until strip tension signifies completion of the feed-out process whereupon the mechanism operates to release the pawl from the catch so that the element displaces the intermediate gear away from the drive position.

18. Apparatus as claimed in claim 15, in which drive is transmitted through an arcuately movable intermediate gear to the friction clutch, the gear being urged by a drive spring to an intermediate position at which it meshes with a drive gear, the intermediate gear being positionally controlled by a push rod having a nose resiliently urged against a cam rotated by a mode control switch.

19. Apparatus as claimed in any one of claims 2 to 4 or 11 to 18, in which the first and second assemblies are respectively arranged to accommodate cartridges at spaced positions.

20. Apparatus as claimed in claim 19, in which the feed-out means comprises a



single feed-out device movable to feed strip from either cartridge position.

21. Apparatus as claimed in claim 20, in which the cartridge positions lie beside one another.

22. Apparatus as claimed in claim 21, including a deflector selectively positioned by insertion of a cartridge to provide a guide slot for movement of the feed-out device to the cartridge position containing the inserted cartridge, the deflector simultaneously closing an alternative guide slot leading to the empty cartridge position.

23. Apparatus as claimed in claim 22, in which the deflector is positionally controlled by two sensing members responding, respectively, to the insertion of the two different cartridge types in their respective positions.

24. Apparatus as claimed in claim 22, in which the deflector is spring-biased to one position at which one guide slot is open, and is movable to a second position by a sensing member in response to the insertion of a cartridge in the cartridge position associated with the other guide slot, the deflector in said second position closing said one guide slot and opening the other guide slot.

25. Apparatus as claimed in claim 21, in which the feed-out device is rockable by a lever between two positions at which it is movable respectively into the openings of two different types of cartridges whose mounting positions are arranged to lie in planes which converge towards one another and define the same angle as the rocking angle of the feed-out device.

26. Apparatus as claimed in claim 19, in which the two cartridge positions are spaced endwise from each other.

27. Apparatus as claimed in claim 26, in which a separate mode control switch is provided for each of the cartridge positions and mechanical interlocking prevents operation of one mode control switch when the other is in use.

28. Apparatus as claimed in any one of claims 19 to 26, in which a single mode control switch has two directions of rotation respectively associated with the two types of cartridges, and oppositely directed ratchet wheels on the mode control switch are selectively engaged by locking pawls to determine the permitted direction of rotation of the switch in accordance with the type of cartridge inserted which is sensed by pawl control members.

29. Apparatus as claimed in any one of claims 19 to 28, in which the cartridge positions are provided each with connectors polarized to suit a particular type of cartridge associated with that position.

30. Apparatus as claimed in any one of claims 19 to 26, including two mode control switches associated with respective types

of cartridge, and a mode-enabling switch biased in one direction but movable against the bias by the insertion of one of the cassettes to disconnect electrical supply connections to one mode control switch and reconnect such connections to the other mode control switch associated with the cartridge position into which the cartridge has just been inserted.

31. Apparatus as claimed in any one of claims 1 to 4, including a carriage into which a cartridge of either type can be fitted, a displacing mechanism operable to drive the carriage in turn past the two cartridge positions, sensing devices at each of the positions and adapted to respond to the cartridge in the carriage belonging to the type associated with that cartridge position, and connections at each cartridge position for halting operation of the mechanism when the cartridge carried by the carriage is of a type identified with that particular cartridge position.

32. Apparatus as claimed in claim 31, in which each cartridge position is provided with its own drive unit, its own strip feed-out device, and a switch which is operated by the carriage and completes an electrical energization circuit to the drive unit and feed-out device if the sensing device at the cartridge position recognizes the cartridge as being of a type to be used at that position.

33. Apparatus as claimed in claim 2, claim 3 or claim 4, in which the two assemblies are respectively associated with the same cartridge position, and sensing means identify the type of cartridge located there and operate to immobilize that part of the feed-out means which are not to be used with that particular type of cartridge.

34. Apparatus as claimed in claim 33, in which the sensing means include a sensing arm pivoted at one end and having a sensing part locatable in an aperture in one type of cartridge but not in the other, the arm being spring-biased towards a position at which it lies in the insertion path of a cartridge and having a locking pin lying in the path of movement of one of the drive units, the arrangement being such that the absence of an aperture capable of co-operating with the sensing pin causes an inserted cartridge to move the arm to a position at which the locking pin releases said one drive unit of co-operation with the reel of the inserted cartridge.

35. Apparatus as claimed in claim 33, including a mandrel for driving the center-driven cartridge and which is axially displaceable by insertion of a peripherally-driven cartridge, a drive for the mandrel being disconnected by such axial displacement which also moves a locking element from a position at which it obstructs approach of a peripheral drive unit to the cartridge position.

36. Apparatus as claimed in claim 35,



in which the mandrel is driven by a pulley engaged by a drive belt which also runs selectively over two coaxially arranged pulleys one of which is an idler pulley and the other of which is a drive pulley, the belt running over the drive pulley in the normal position of the mandrel and over the idler pulley in the displaced position of the mandrel.

37. Apparatus as claimed in claim 35 or claim 36, in which the mandrel is spring-biased towards its normal position, and a lever linkage engaged by one end of the mandrel controls the movement of the locking element which is arranged as a bell-crank lever having one arm in the path of movement of a radial arm fixed to a sleeve carrying the peripheral drive unit, the sleeve being spring-biased to move the peripheral drive unit towards the cartridge position.

38. Apparatus as claimed in claim 37, in which the peripheral drive unit is driven through a gear train mounted in a radial arm on the sleeve through which passes a rotary shaft for transmitting drive to the gear train.

39. Apparatus as claimed in any one of claims 1 to 4 or 33 to 38, including a mechanism for centering the feed-out means with respect to an extraction opening in a cartridge, the centering mechanism comprising a carriage on which is pivotally mounted an arm carrying the feed-out means at its free end, a path along which the carriage is guided and which extends parallel to the plane of the extraction spring, and a thickness-sensing member disposed at the side of the cartridge position and coupled to control the position of the carriage along its path; the arrangement being such that the carriage is moved along its path to a different position for each size of cartridge and each position is such that the feed-out means are centered in the extraction opening for that cartridge size.

40. Apparatus as claimed in claim 39, in which the carriage carries a rack having skewed teeth meshing with skewed teeth on a transversely movable sector provided on one end of a lever constituting the thickness-sensing member which is positionally controlled by the size of cartridge inserted.

41. Apparatus as claimed in any one of claims 1 to 4, including a pivoted arm adapted to carry a detachable mandrel for rotating said second type of cartridge reel, the arm being movable between a storage position and an operational position at which an interlock prevents movement of the first drive unit towards the cartridge position.

42. Apparatus as claimed in claim 42, in which the interlock is provided by a cam rotated with the pivoted arm and engaged by a nose of a push rod movable by the cam between two positions to lock and free movement of the first drive unit, respectively.

43. Apparatus as claimed in claim 2, claim 3 or claim 4, in which the first assembly includes: a hinged element having two spaced projections positioned to engage correspondingly spaced apertures in an edge-portion of said one cartridge; a shoulder extending substantially diametrically of the cartridge position and parallel to the hinge axis of the element; and a resilient bias urging the projections towards a position at which they lie in the path of an inserted cartridge, and away from a position at which the portion of the element carrying the projections is located in a recess at the side of the cartridge position.

44. Apparatus as claimed in claim 2, claim 3, claim 4 or claim 43, in which the second assembly includes: a mandrel, an abutment surface extending substantially diametrically of the cartridge position, a pivoted arm carrying a pin positioned to engage in a cut-out in one edge-portion of said other type of cartridge, and a spring urging the arm in a direction towards the abutment surface plane and to a rest position at which the pin is positioned to locate in the cut-out of said other type of cartridge.

45. Apparatus as claimed in claim 44 when dependent on claim 43, in which the abutment surface is provided by the rib, the mandrel is removable, the two types of cartridges are accommodated in substantially the same position and insertion of said one cartridge type causes the pin-carrying arm to displace against the spring and insertion of said other cartridge type displaces the portion of the element carrying the projections into the recess.

46. Apparatus as claimed in any one of claims 2 to 4 or 43 to 45, in which the feed-out means is provided at one end of a positioning arm pivoted at its other end to move the feed-out means towards and away from the position of a strip-extraction opening in the cartridge.

47. Apparatus as claimed in claim 46, in which the feed-out means includes three rollers having their axes disposed at the corners of a triangle and one of which is driven, a belt passing around the three rollers, and a stripper extending along, but spaced from, one run of the belt which travels away from one of the rollers which engages the periphery of a strip coil wound on the reel when the feed-out means is in its operational position, so that the leading end of the strip is fed out of the cartridge between the stripper and said one run.

48. Apparatus as claimed in claim 47, including a spring-loaded lever pivoted to the stripper on the side opposite to said one run of the belt and for closing the adjacent portion of the strip-extraction opening by providing a surface extending from a position



adjacent the strip-engaging end of the stripper to one end of said opening.

49. Apparatus as claimed in any one of claims 1 to 4 or 43 to 48, in which the drive unit for said one cartridge is positionally controlled by a selector switch having two positions at one of which it allows a spring to displace the drive unit sufficiently to bring it into driving relationship with a cartridge reel, while at the second position of the selector switch the approach of the drive unit to the cartridge is limited.

50. Apparatus as claimed in claim 49, including a connection extending between a mode control switch and a part of the selector switch, and which prevents the spring displacing the drive unit unless the mode control switch is in one particular position.

51. Apparatus as claimed in claim 50, in which the connection comprises a push-rod spring-loaded towards a cam on the mode control switch and engaging with its other end said part of the selector switch to prevent approach of the drive unit to the cartridge position until rotation of the mode control switch to a position at which the cam frees the push-rod from engagement with said part.

52. Apparatus as claimed in claim 49, claim 50 or claim 51, in which the portion of the cartridge selector switch positionally controls a part of one of said cartridge-locating assemblies to move said part out of the path of an inserted cartridge which is not of the type for which said one of the assemblies is designed to accept.

53. Apparatus as claimed in claim 50, in which the mode control switch has a second connection controlling operation of the feed-out means in accordance with the switch position.

54. Apparatus as claimed in claim 53, in which the second connection comprises a linkage operated by a cam on the mode control switch and positionally controlling an idler gear wheel movable between two positions at one of which it is spaced from a drive gear and at the other of which it meshes with the drive gear to transmit drive from it to a second gear which drives the feed-out means.

55. Apparatus as claimed in claim 54, in which the second gear drives through a friction clutch an arm pivoted to turn about the axis of a second gear and carrying at its free end the feed-out means, the arm being resiliently biased towards a rest position and being moved by the drive transmitted through the friction clutch to an operational position at which the feed out device is located to feed a strip end from the cartridge.

56. Apparatus as claimed in claim 55, in which the second gear rotates a pulley belt-connected to a further pulley driving a drive unit mounted with the feed-out means at the free end of the pivoted arm.

57. Apparatus as claimed in claim 54, claim 55 or claim 56, in which the linkage comprises a push-rod having one end spring-biased against the cam of the mode control switch and its other end pivoted to one end of a link having its other end pivoted to the axis of the second gear, the idler gear being mounted on the link intermediate its ends.

58. Apparatus as claimed in claim 1, arranged and adapted to operate substantially as described with reference to the accompanying drawings.

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