March 20, 1945. J. F. MORSE 2,371,771

WEB TREATING APPARATUS

Filed May 22, 1944 2 Sheets-Sheet 1

Fig. 1.

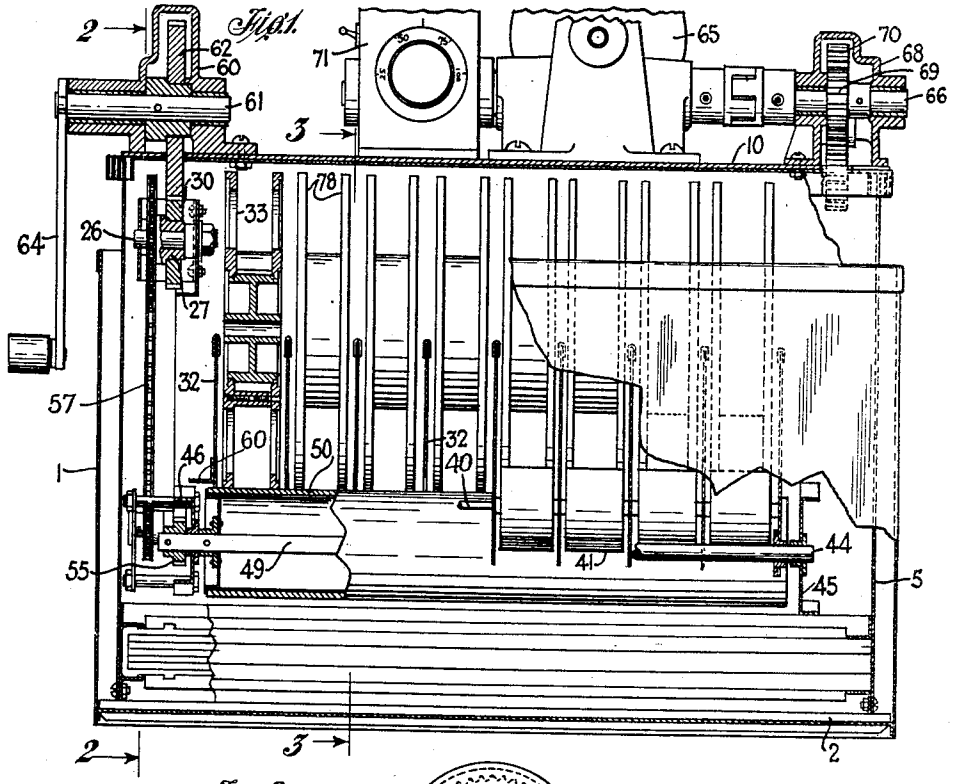
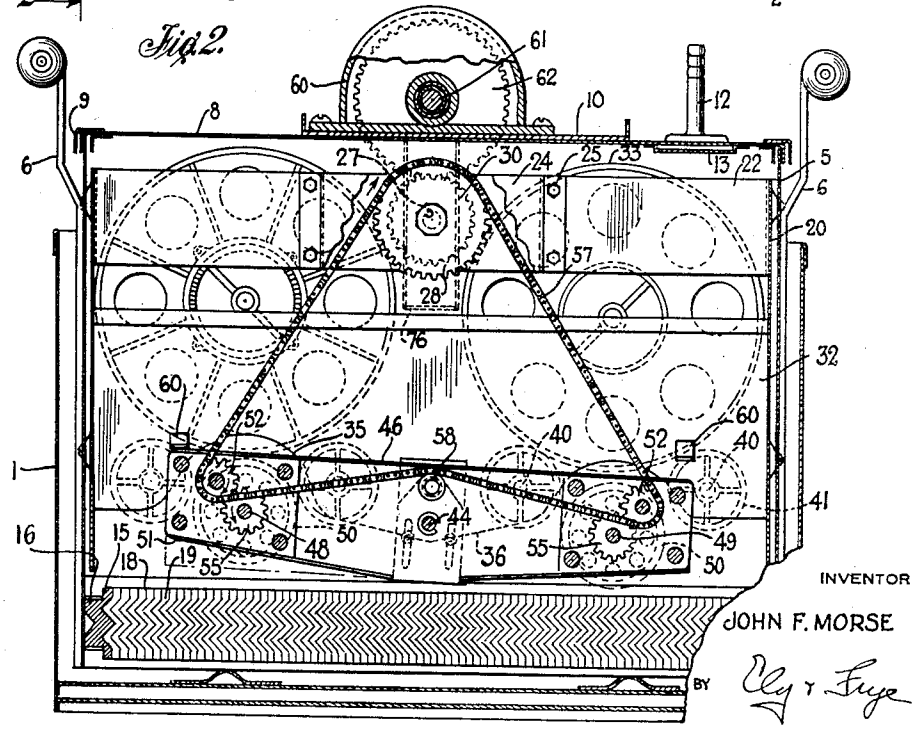


Fig. 2.



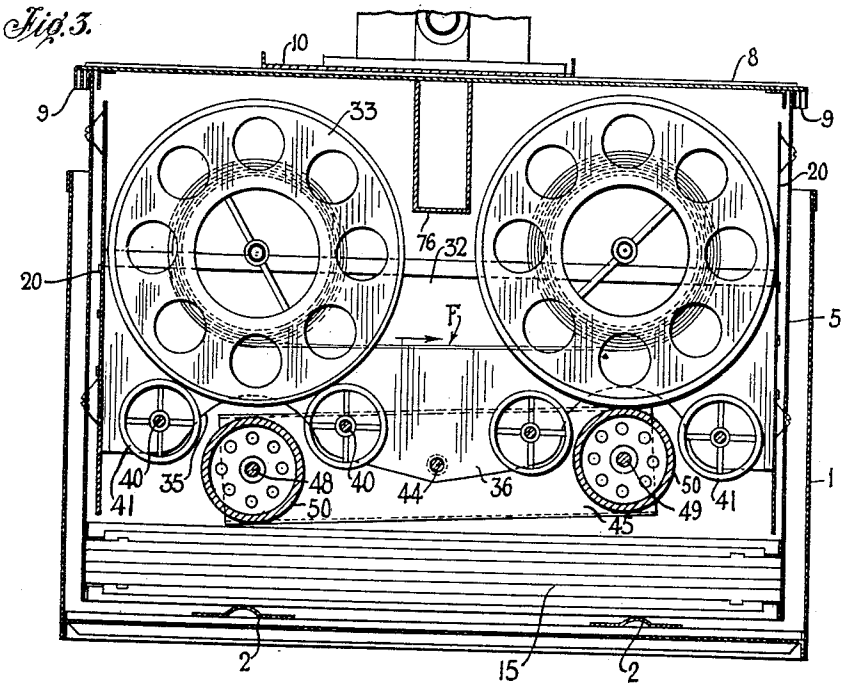
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Fig. 3.



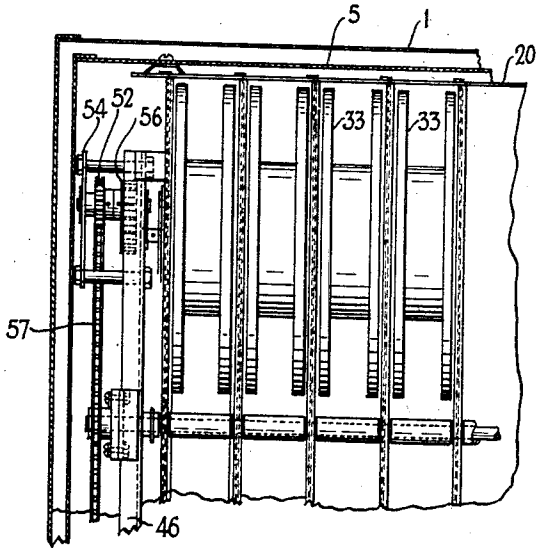


Fig. 4.

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WEB TREATING APPARATUS

John F. Morse, Hudson, Ohio

Application May 22, 1944, Serial No. 536,839

20 Claims. (Cl. 242—65)

The present invention relates to devices such as used in the development of photographic films, and has as its object the perfection of a simple and effective apparatus for simultaneously winding and rewinding films while they are being treated.

While the invention described herein is particularly adapted and intended for use for the development of a plurality of motion picture films, the broader principles may be used for treating a single film. The invention may also be adapted to other lines of work where it is desirable to provide means for simultaneously winding and rewinding webs of all types.

In the type of work for which the invention is primarily intended it is desirable to develop many films as rapidly as possible. However, the films may be of varying lengths and when it is desired to develop simultaneously a number of these films with existing apparatus, it has been necessary as a preliminary step to splice leaders on the shorter films to make all of the films of the same length, otherwise the existing machines will either come to a stop or reverse when the shortest film has run its course through the machine, leaving the end portions of longer films undeveloped.

The object of the present invention is to devise a machine which may be loaded with a multiplicity of films, and although these films may be of greatly varying lengths, the machine will continue to operate until all of the films have been completely unwound from their spools, whereupon the direction of winding is reversed, either automatically or by hand, and the films are rewound as many times as may be required to complete the operation.

The object is accomplished by the simple and effective means shown herein, but it will be understood that the invention is not necessarily limited to the details shown and described.

In the drawings in which the best known and preferred embodiment of the invention is illustrated:

Fig. 1 is a side view of the apparatus embodying the invention, portions thereof being broken away at various points to show the internal construction;

Fig. 2 is a vertical section on the line 2—2 of Fig. 1 showing the drive mechanism, the tilting frame being in the position to wind the films on the left hand spools;

Fig. 3 is a vertical section on the line 3—3 of Fig. 1, in which the tilting frame is shown in the reverse position; and

Fig. 4 is a partial plan view taken under the cover.

In the drawings 1 represents a tank which is designed to hold a supply of developer, fixer or other bath for treating the films. The floor of the tank is provided with at least two ribs 2 on which the film holder and its operating mechanism will rest. This holder or casing is designed for daylight operations, that is to say it is loaded with a plurality of films in the dark room but it is completely light-sealed and may be taken out of the dark room and the developing operations performed in daylight.

To this end the machine comprises a rectangular body indicated by the numeral 5 usually made of sheet metal and provided with two handles 6 by which it may be lifted into and out of the baths in which the set of films is treated. The top of the body is provided with a removable cover 8 around the edges of which is any desirable form of light seal indicated by the numeral 9. Across the top of the cover is located a reinforced platform 10 on which the film propelling mechanism is mounted, as will be later described. At any suitable point, preferably in the cover, a vent 12 is located, a light shield or baffle indicated by the numeral 13, being provided at this point.

The bottom of the holder or body is provided with a light sealing grid work indicated generally by the numeral 15. This is of any design that will be adequate to prevent light from penetrating through the bottom of the holder but will permit the liquid to flow into the holder when it is lowered into the bath, and to drain therefrom when it is lifted out of the bath. In the form shown this consists of a rectangular frame work 16 in which are secured a multiplicity of undulating sheets or plates 18 which are assembled in the manner shown to provide a plurality of circuitous passages 19 which will permit the liquid to pass therethrough, but which will shut off light from entering the interior of the holder.

Attached to the opposite side walls of the holder are the two side plates 20 which support the operating devices within the holder. Near the top of the holder and attached to the plates 20 is the vertical beam 22 to the central portion of which is attached the supplemental plate 24 by means of the bolts 25. Mounted between the parts 22 and 24 is the transverse shaft 26 on which is rotatably mounted the sleeve 27 carrying the sprocket 28 and the driving gear 30.

Secured to the lower portions of the plates 20 and spanning the space across the holder are a plurality of transverse walls or partitions 32. In

the form shown herein there are nine of these partitions, which divide the space into eight cells or compartments each of which is designed to receive a film F and the two spools to which it is attached, the spools being indicated at 33. The upper edge of each partition is preferably reinforced as shown in Fig. 1. The lower edges of the partitions are provided with recesses 35 (Fig. 3) and with an intermediate depending portion 36.

Extending across the several partitions on either side of the recesses are the four shafts 40 arranged in pairs and located on these shafts between each pair of partitions are the several idler rollers 41 which turn freely thereon. When the film is placed in each compartment the rims of the full spool of each film rest upon the two rollers 41 so that it may turn thereon as the film is wound from that spool on to the receiving spool.

Located centrally of the several partitions in the depending portion 36 is the horizontal shaft 44. On the end of the shaft remote from the driving mechanism is located the rocking beam 45. Attached to the other end of the shaft 44 is a similar rocking beam 46.

Extending across the rocking beams 45 and 46 are the two rotating shafts 48 and 49 each of which is located between the adjacent pairs of idler rollers 41 and at the recesses 35. Fixed to each shaft is a long drive roll 50 which is so located and designed that as the rocking frame moves from one side to the other, one of the rolls 50 will move between the adjacent rollers 41 and lift that series of spools off the rollers and drive them by frictional contact. When the other drive roll is lowered, by the movement of the rocking frame, the other series of spools will be lowered on to the other set of rollers 41 where they may turn idly as the films are being unwound therefrom.

The means for driving the rolls 50 and actuating the rocking frame in which they are carried will now be described. Adjacent each shaft 48 or 49 on the beam 46 is a sprocket 52 secured to a shaft 53 supported in the beam and the bearing plate 54 attached thereto. The shaft 53 carries a gear 56 which meshes with a gear 55 attached to the adjacent shaft 48 (or 49). A sprocket chain 57 is trained over the sprockets 52 and the sprocket 28 previously described. Between the sprockets 52 the chain runs over the adjustable idler sprocket or roller 58 by which any slack in the chain may be taken up.

When the sprocket 28 is rotated in the clockwise direction, as shown in Fig. 2, the resistance to rotation of the rolls 50 is such that the rocking frame is first raised to the position shown in Fig. 2, its movement being arrested by a stop 60 located on the front partition 32. This movement projects the left hand roll 50 between the idler rollers 41, raising the left hand spools off the rollers. At the same time the right hand drive roll 50 is lowered, depositing its spools on the rollers 41, whereupon the continued rotation of the sprocket 28 will, due to the intermediate gearing, drive the spools at the left and unwind the spools to the right. As the film on each right hand spool is completely unwound, both spools connected to that film will cease rotation, the frictional contact between each spool and the drive roll 50 being sufficient to drive that spool while there is still some film to be wound, but permitting the drive roll to slip under the rims of the spool when its film is completely rewound. For this purpose each end of the film is securely attached to its spool.

When all of the films are completely wound in one direction, the operator will be apprised of that fact because he no longer is able to hear any movement of the spools. He then reverses the direction of the chain and the right hand drive roll 50 rises as shown in Fig. 3, reversing the winding, this operation being repeated until the treatment of the films has been completed. It will be seen that by the mechanism described, it is not required that the films be of uniform length for the shorter films will cease to unwind without interfering in any way with the continued operation until the longest film has been completely wound in either direction on its receiving spool. While a sprocket chain and sprockets are preferred, due to their positive action, the mechanically equivalent belt and smooth pulleys may be employed.

For driving the gear 30 provision is made for either manual or motor driven operation, the appropriate mechanism for this purpose being mounted on the platform 10 and being so arranged that when the cover is placed, as shown in Fig. 1, the mechanism is operated by hand, and when the cover is reversed it is arranged for motor operation.

In the mechanism, when placed as illustrated in Fig. 1, the left hand side of the cover carries a housing 60 secured to the platform over the gear 30. In this housing is the shaft 61 to which is attached the gear 62 which projects through the cover and meshes with the gear 30. An operating crank 64 is attached to the end of the shaft 61.

For motor operation a motor 65 is fastened to the platform 10 and drives a horizontal shaft 66 which is extended into a housing 68. A pinion 69 is mounted on the shaft 66 and meshes with a larger driving gear 70, also mounted in the housing and projecting through the cover so that when the position of the cover is reversed, this gear 70 will mesh with the gear 30. A control device, indicated at 71 is connected to the inner end of the shaft 66 and is equipped with an adjustable limiting means which may be set so as to reverse the motor when it has operated sufficiently so that the longest film which may be encountered has been completely wound on its receiving spool.

To the underside of the cover is attached a mid rib 76 which, when the cover is in place, lies between the rows of spools and serves to keep the spools in position on the rolls 50 during the winding operation.

While the spools may be of any suitable design, that shown herein is preferred. These spools are characterized by the provision of broad rims 78 which provide sufficient surface for the frictional drive. The spools are also provided with means to clamp the ends of the film securely so that it will not be detached by the pull exerted by the continued rotation of the drive roll.

The operator first removes the films from the standard camera spools and loads each film on a spool 33 and attaches the free end on the other spool 33, taking care to clamp its ends securely to the spool. He then loads the casing with a series of films, placing all of the filled spools on one side and the empties on the other and replaces the cover, locating it for either operation as may be desired. Rotation of the sprocket 28, either through the hand-crank or by the motor in the direction to rock the frame and lift the roll 50 under the empty spools will start the

empty spools in the direction to wind the films thereon. If the operation is by hand, the operator will continue to rotate the crank until all noise of revolving spools ceases, whereupon he reverses the crank and the winding starts in the other direction. In case the operation is by motor, the limiting device is set to reverse the motor after the longest film has been completely unwound.

The apparatus is simple and effective for simultaneously treating a multiplicity of films and its operation is not affected by the fact that the films may be of varying lengths. The apparatus is so constructed and designed that each of the receiving spools will be rotated until it is completely filled, and any differences in film lengths between individual films will not affect the operation. While the device is especially designed for the treatment of a plurality of photographic films, it may be adapted and used for treating all types of webbing which are supplied on spools and which are to be passed back and forth through a treating chamber.

What is claimed is:

1. An apparatus for treating a spool-carried web which is to be wound and rewound comprising a casing, two sets of idler rollers in the casing to support the spools by their rims, a drive roll associated with each set of idler rollers, means to drive said rolls in opposite directions alternately and to bring each roll into frictional driving contact with the spool which is to receive the web.

2. An apparatus for treating a spool-carried web which is to be wound and rewound comprising a casing, two sets of idler rollers in the casing to support the spools by their rims, a drive roll associated with each set of idler rollers, means to drive said rolls in opposite directions alternately and to bring each roll into frictional driving contact with the rims of the spool which is to receive the web.

3. An apparatus as described in claim 1 in which the casing is portable and light sealed.

4. An apparatus for treating a web which is to be wound and rewound on spools, means to drive the spools in opposite directions alternately comprising two sets of idle rollers, each set comprising parallel rollers on which the rims of spools may rest while the web is unwinding therefrom, a drive roll for each set of idle rollers, and means to project each said roll between the parallel rollers of a set to lift the spools from the rollers and drive them by frictional contact.

5. A machine as set forth in claim 4 in which the drive rolls are projected between the rollers alternately as the direction of the web is reversed.

6. In an apparatus for winding a spool-carried web alternately in opposite directions comprising a casing, two sets of idle rollers located on opposite sides of the casing upon which the spools rest while the web is being unwound therefrom, a rocking frame in the casing, a driving roll on each side of the frame, means to drive said rolls in opposite directions, and means to rock the frame to bring said rolls alternately in frictional engagement with the spool which is to receive the web.

7. In an apparatus for winding a spool-carried web alternately in opposite directions comprising a casing, two sets of idle rollers located on opposite sides of the casing upon which the spools rest while the web is being unwound therefrom, a rocking frame in the casing, a driving roll on each side of the frame, means to drive said rolls in opposite directions, and means to rock the frame to bring said rolls alternately in frictional engagement with the spool which is to receive the web and to lift the spool from the idle rollers.

8. In an apparatus for winding and rewinding a plurality of spool-carried webs comprising a casing, two sets of rollers located on opposite sides of the casing, each set comprising spaced parallel rollers upon which the rims of the spools rest while the webs are being unwound therefrom, a rocking frame in the casing, drive rolls on opposite sides of the frame, means to drive the rolls in opposite directions, said driving means also operating to rock the frame and raise a roll between the spaced parallel rollers on one side of the casing and lift the several spools from the rollers.

9. An apparatus as described in claim 8 in which the casing is portable and light sealed.

10. In an apparatus for winding and rewinding a plurality of spool-carried webs, comprising a casing, two sets of rollers located on opposite sides of the casing, each set comprising spaced parallel rollers upon which the rims of the spools rest while the webs are being unwound therefrom, a rocking frame pivoted in the casing, drive rolls on opposite sides of the frame, each roll being located between the parallel rollers on one side of the casing, a sprocket connected to each roll, a sprocket chain trained over the sprockets, and means to drive the chain to rock the frame and raise a roll between the parallel rollers.

11. In an apparatus for winding and rewinding a plurality of spool-carried webs comprising a casing, partitions dividing the casing into a plurality of compartments, a spool support in each compartment, two spool driving rolls extending along the compartments, each roll being located below the support at one side of the casing, means to raise the rolls alternately to lift the several spools on one side of the casing from their supports, and means to drive the rolls.

12. In an apparatus for winding and rewinding a plurality of spool-carried webs comprising a casing, partitions dividing the casing into a plurality of compartments, two pairs of spool supports in each compartment, each spool of a web resting upon one pair of supports, two spool driving rolls extending along the compartments, each roll being located between the pairs of supports at one side of the casing, means to raise and lower the rolls alternately to lift the several spools on one side of the casing from their supports and to lower the spools on the other side of the casing on to the supports, and means to drive the rolls.

13. In an apparatus for winding and rewinding a plurality of webs comprising a casing, transverse partitions dividing the casing into a plurality of compartments, two pairs of rollers in each compartment, each end of the web being supported upon one pair of rollers, a rocking frame in the casing, an elongated drive roll on each side of the frame, each drive roll being located between the rollers on one side of the casing, means to drive the rolls and rock the frame so as to cause one of said rolls to lift all of the webs on one side of the casing from their supporting rollers and drive them in the direction to wind the webs.

14. In an apparatus for winding and rewinding a plurality of webs comprising a casing, transverse partitions dividing the casing into a plurality of compartments, two pairs of rollers in each compartment, each end of the web being

supported upon one pair of rollers, a rocking frame in the casing, an elongated drive roll on each side of the frame, each drive roll being located between the rollers on one side of the casing, and a single means to drive the rolls and rock the frame so as to cause one of said rolls to lift all of the webs on one side of the casing from their supporting rollers and drive those webs in the direction to wind the webs.

15. In an apparatus for winding and rewinding a plurality of webs comprising a casing, transverse partitions dividing the casing into a plurality of compartments, two pairs of rollers in each compartment, each end of the web being supported upon one pair of rollers, a rocking frame in the casing, an elongated drive roll on each side of the frame, each drive roll being located between the rollers on one side of the casing, and means to drive the rolls and rock the frame so as to cause one of said rolls to lift all of the webs on one side of the casing from their supporting rollers and drive those webs in the direction to wind the webs, the rocking of the frame causing the other drive roll to deposit the webs on the other side of the casing on their supporting rollers.

16. In an apparatus for winding and rewinding a plurality of webs comprising a casing, transverse partitions dividing the casing into a plurality of compartments, two pairs of rollers in each compartment, each end of the web being supported upon one pair of rollers, a rocking frame in the casing, an elongated drive roll on each side of the frame, each drive roll being located between the rollers on one side of the casing, and a single means to drive the rolls and rock the frame so as to cause one of said rolls to lift all of the webs on one side of the casing from their supporting rollers and drive those webs in the direction to wind the webs, the rocking of the frame causing the other drive roll to deposit the webs on the other side of the casing on their supporting rollers.

17. In an apparatus for winding and rewinding a plurality of webs comprising a casing, transverse partitions dividing the casing into a plurality of compartments, two pairs of rollers in each compartment, each end of the web being supported upon one pair of rollers, a rocking frame beneath the compartments, an elongated drive roll on each side of the frame, each drive roll being located between the rollers on one side of the casing, sprockets carried by the frame and a driving sprocket in the casing, means to drive the last named sprocket in opposite directions, a chain passing over said sprockets, and connections between the drive rolls and the frame-carried sprockets which drive the rolls in the direction to wind the adjacent web, the pull on said chain also serving to tilt the frame and cause each drive roll to lift the webs on one side of the casing from their rollers.

18. In an apparatus for winding and rewinding a plurality of spool-carried webs comprising a casing, transverse partitions dividing the casing into a plurality of compartments, two pairs of idle rollers in each compartment, each spool being supported upon one pair of rollers, a rocking frame beneath the compartments, an elongated drive roll carried on each side of the frame and located between the rollers on either side of the compartment, sprockets carried on the frame and a driving sprocket in the casing, means to drive the last named sprocket in opposite directions, a chain passing over the sprockets, and connections between the rolls and the sprockets so that when the chain is moved in the direction to lift one side of the frame the drive roll on that side of the frame will drive the spools on that side of the casing in the direction to wind the web thereon, said rolls being movable between the rollers by the rocking of the frame to lift the spools from the rollers and drive them by frictional contact.

19. An apparatus for winding and rewinding a plurality of photographic films carried upon spools, comprising a light sealed casing, transverse partitions dividing the casing into a plurality of compartments, two pairs of idle rollers in each compartment, each spool being supported by its rim upon one pair of rollers, a rocking frame beneath the compartments, an elongated drive roll on each side of the frame, said drive rolls having frictional driving surfaces to contact and drive the spools, each said drive roll being located between the pairs of rollers on either side of the casing, sprockets carried by the frame and a sprocket carried by the casing, means to drive the last named sprocket in reverse directions, a chain passing over the sprockets, connections between the drive rolls and the sprockets, and a frame designed and arranged so that when the chain is propelled in one direction it will elevate one side of the frame to project that roll between the rollers, raise the spools from the rollers and drive them by frictional engagement in the direction to wind the films thereon.

20. An apparatus as described in claim 19 in which selective manual and power operated means are provided for driving the chain.

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