Dec. 20, 1960 J. E. FOSTER 2,965,323

MACHINE FOR REWINDING FILM OR TAPE

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FIG. 1

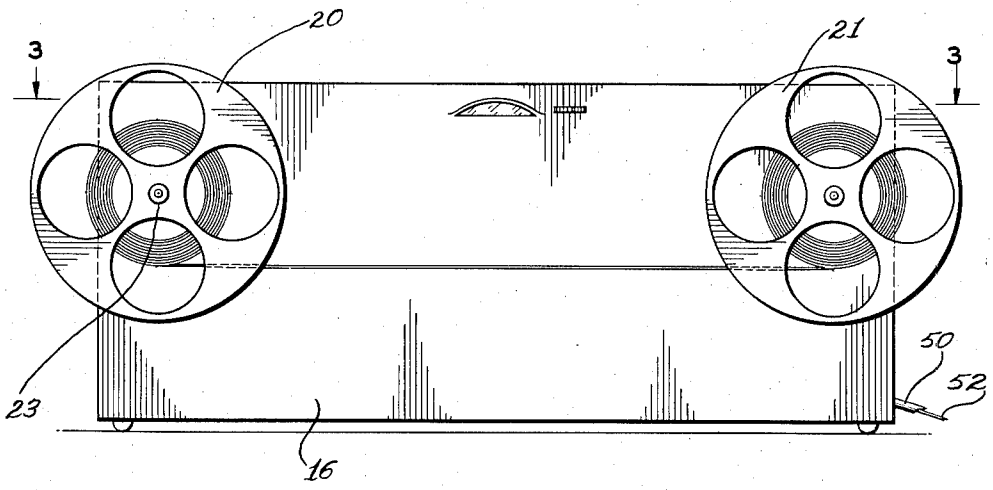
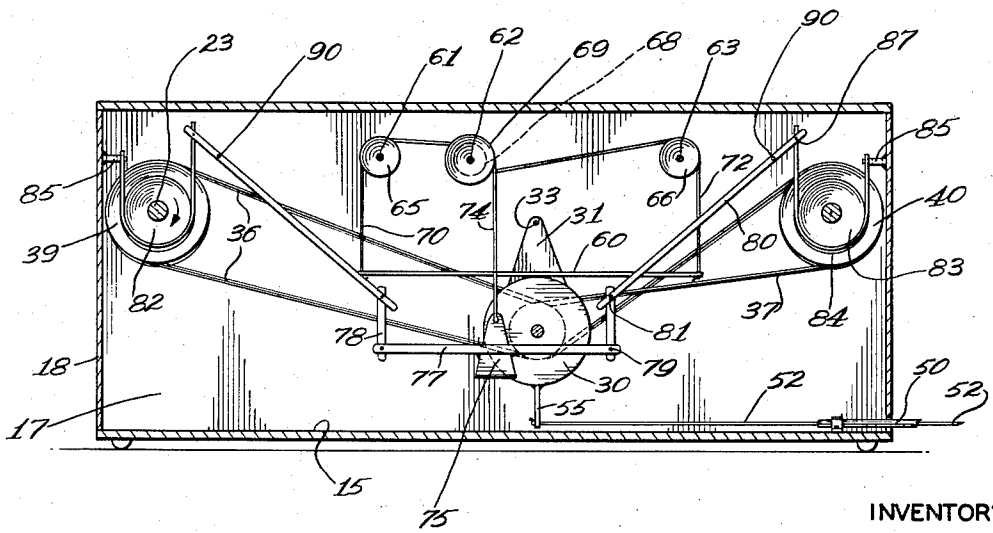


FIG. 2



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FIG. 3

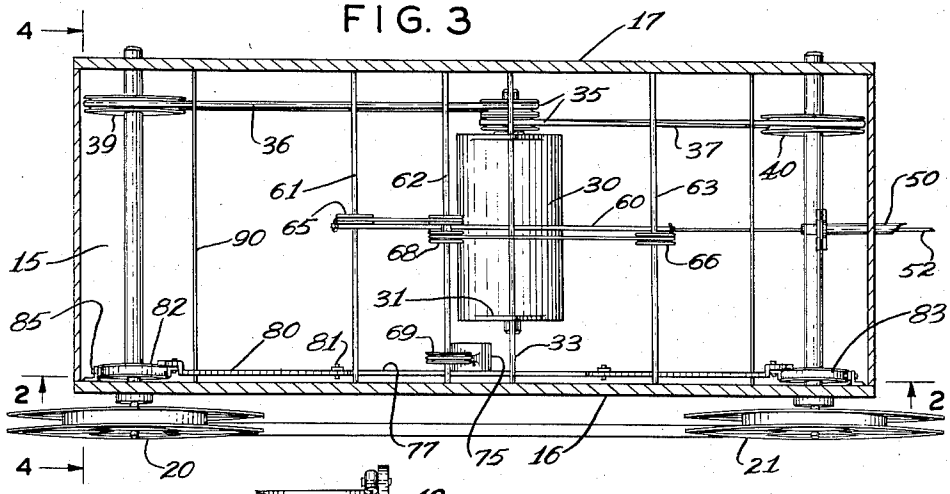


FIG. 7

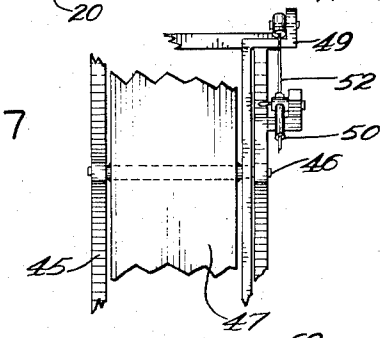
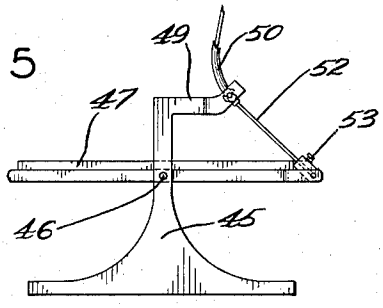


FIG. 5



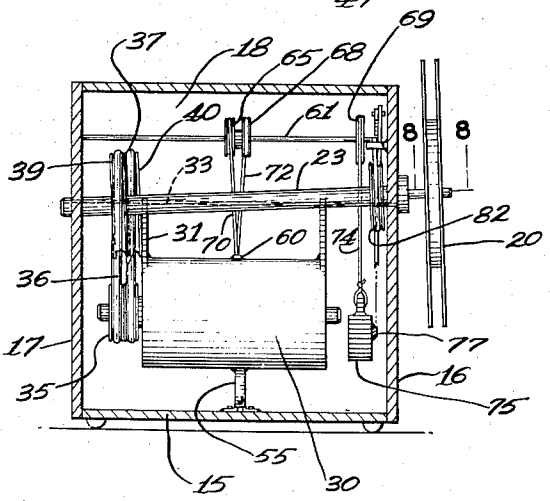


FIG. 6

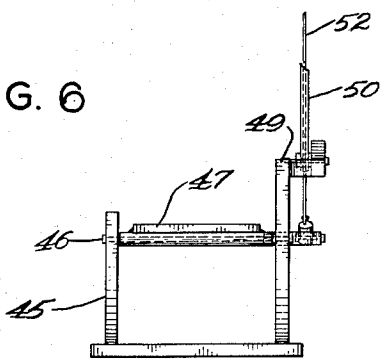


FIG. 4

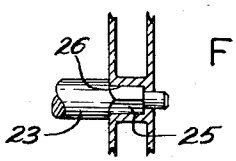


FIG. 8

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MACHINE FOR REWINDING FILM OR TAPE

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Filed Feb. 14, 1956, Ser. No. 565,369

4 Claims. (Cl. 242—55.12)

My invention relates to film—or tape—as wound on one reel from another or rewound on the original reel. Machines have been devised wherein such reels are motor driven to render the process rapid. However, the problems of controlling the speed of the reels in accordance with requirements and regulating the course of the film have presented difficulties and caused the machines to become unduly complicated. In order to provide an efficient machine for the above purpose, it is one object of the present invention to apply a motor drive to the reels which can be controlled by simple means to rotate either reel for a winding operation.

A further object is to situate the motor between the reels, operate these by belt drives from the motor, and provide means for tensioning either drive for rotating only the related reel.

Another object is to provide a pendulum type of suspension for the motor, whereby to secure the tensioning means referred to by simply swinging the motor accordingly.

An additional object is to provide brakes for the reels which are fully engaged while the reels are not in operation, but releasable automatically and in proportion to the speed imparted to the winding reel.

A still further object is to provide brake means exerting a greater influence on the trailing reel, in order that it may pay out the film only as required by the winding reel.

An important object is to provide a simple manual control for the operation of the reels.

With the above objects in view, a better understanding of the invention may be had by reference to the accompanying drawings, in which—

Fig. 1 is a front elevation of the machine;

Fig. 2 is a frontal internal view, as taken on the line 2—2 of Fig. 3;

Fig. 3 is a section on the line 3—3 of Fig. 1;

Fig. 4 is a vertical section on the line 4—4 of Fig. 3;

Fig. 5 is a side elevation of a rocker-type control device;

Fig. 6 is a rear elevation of such device;

Fig. 7 is a top plan view of the showing in Fig. 6, partially broken away; and

Fig. 8 is a magnified section on the line 8—8 of Fig. 4 showing a reel connection.

In accordance with the foregoing, specific reference to the drawings indicates the housing for the novel mechanism at **15**, the same being of horizontal box type or any other suitable form. The front and rear walls of the housing are indicated at **16** and **17**, respectively, and the end walls at **18**.

Fig. 1 shows that a pair of film-bearing reels **20** and **21** are positioned in front of the housing **15**, such reels being mounted on shafts **23**. The latter are journaled in the front and rear walls of the housing **15**; and the shafts have a slight rearward declination, as shown in Fig. 4, the purpose of which is to retain the reels on the shafts

while these are in rotation, with the reels removably attached. Thus, Fig. 8 shows that each shaft is squared-off at the front as indicated at **25** to receive a similarly formed socket **26** in the center of the reel, so that the latter is rotatable with the shaft when mounted, yet easily removable in forward direction.

Means are disposed inside the housing **15** for operating the reels **20** and **21**, such means originating with an electric motor **30**. As noted in Fig. 4, the motor has upward wings **31** at its ends for suspending the motor in pendulum fashion from a cross-shaft **33** journaled between the front and rear walls of the housing. The motor shaft carries pulleys **35** at the rear, belts **36** and **37** extending from these pulleys to pulleys **39** and **40** carried by the shafts **23** of the reels **20** and **21**, the belt **37** being crossed, as seen in Fig. 2, in order that the reels may be driven in opposite direction from the motor. Also, the belts are mounted to connect the motor with the pulleys **39** and **40** in normally loose relation while the motor is suspended in the medial or plumb position. However, when the motor is swung to the left, as seen in Fig. 2, the belt **37** will become tensioned and transmit the motor drive to the pulley **40**, and when the motor is swung to the right, its drive will engage the pulley **39** in the same manner. Thus, the motor may be manipulated to constitute either pulley as a driving medium to wind film or tape paid out by the companion pulley, since the latter will be free to rotate as the film is drawn from it.

A simple device is provided on the outside of the housing for applying the motor drive to either pulley designed to be the winding one, and to control the speed of such pulley, such device being shown in Figs. 5 to 7. Thus, a standard **45** supported on a floor or other handy surface has a journal **46** for a rocker pedal **47**. The standard has a bracket **49** in which is secured one end of a conduit **50**; and a flexible shaft **52** is connected to one end of the rocker pedal **47** by means of a clamp **53**, such shaft extending into the conduit **50**. Fig. 2 shows that the opposite end of the conduit **50** leads into the housing **15**, and that the flexible shaft **52** continues to a point below the motor **30**, the end of such shaft being secured to an arm **55** depending from the motor. Thus, when the rocker pedal **47** is swung in a counter-clockwise direction, it pushes the flexible shaft **52** with the effect of swinging the motor **30** to the left; and when the rocker pedal **47** is swung in the clockwise direction, the flexible shaft **52** will be drawn upon with the effect of swinging the motor **30** to the right, accomplishing the driving connections previously explained in respect to the reels **20** and **21**. It will be understood that the flexible shaft **52** will be sufficiently firm not to buckle when it is pushed; and the influence on the rocker pedal **47** may be varied by the foot or hand to control the speed of the motor driven reel as desired.

A braking mechanism is associated with the motor drive of the reels **20** and **21**. Thus, a cross-bar **60** is rigidly attached to the top of the motor **30**. Above the cross-bar is a series of three shafts **61**, **62** and **63**, these being journaled in the front and rear walls of the housing. The shafts **61** and **63** carry single pulleys **65** and **66**, while the shaft **62** carries a double pulley **68** near the center, and a frontal pulley **69**. A cable **70** is secured with one end to the cross-bar **60**, trained over the pulley **65**, and trained with the other end over and around one unit of the pulley **68**, then being secured to the same. A similar cable **72** is secured with one end to the cross-bar **60**, trained over the pulley **66**, and trained with its other end under and around the other unit of the pulley **68**, then being secured to the same. A third cable **74** is secured with one end to the frontal pulley **69** and depends to support a weight **75**. The latter is attached

medially to a cross-bar 77, from the end portions of which rise short links 78 pivoted to the bar at 79. Long links 80 are pivoted at 81 to the links 78 and rise with a wide spread to terminate above a pair of brake drums 82 and 83 mounted on the reel shafts 23. These are wrapped with brake bands 84 from underneath, the outer portions of the brake bands being attached to the end walls of the housing 15, as indicated at 85, while the inner ends of the brake bands are connected to the related ends of the links 80, as indicated at 87. The links 80 are pivoted on cross-shafts 90 extending between the front and rear walls of the housing.

It is intended that the reels 20 and 21 be held against rotation as long as the motor 30 is not in operation, this being done by the effect of the weight 75. Thus, the latter is in the lowest position when the motor is at center and bears down on the cross-bar 77 to actuate the links 78 and 80 with the effect of drawing upwardly on the brake bands 84, so that these engage the drums 82 and 83. However, when the motor is put into operation, it is intended that the brakes be released. Thus, in case the motor is swung toward the left—as seen in Fig. 2—to operate the reel 21, this action will tilt the top bar 60 in a clockwise direction to draw on the cable 72. This cable then will draw upon the frontal pulley 69 to wind the cable 74, raising the weight 75. This of course will immediately release the pressure of the brake bands 84 on the drums 82 and 83. In case one of the reels—such as 20—is to be rotated in order to draw film from the reel 21, the rocker pedal 47 is tilted in clockwise direction—as seen in Fig. 5—to draw the motor 30 to the right, according to Fig. 2. The running direction of the motor is clockwise, and the reel 20 therefore will be rotated in the same direction, drawing film from the reel 21, which runs freely. As the reel 20 takes on film, the surface speed of the latter will increase. As this goes on the demand on the reel 21 will take up any possible slack in the film and prevent the same from piling up. Also, such a possibility is counteracted by the operation of the braking mechanism. Thus, with the reels and the film connected as in Fig. 1, it follows that the winding action of reel 20 in the direction of the arrow in Fig. 2 will cause reel 21 to rotate in the same direction. When the winding is to be stopped, the return of the rocker pedal 47 to the original position and the resulting application of the brakes—by way of the links 78 and 80—would appear to be uniform, but the brake bands 84 actually operate with a bias favoring reel 21. Thus, while the brake for reel 20 draws up on the free (inner) side of the band 84, the drum 82 rotates with a tendency to pull down on such side and slacken the brake. On the other hand, when the brake for reel 21 draws up on the free (inner) side of the band 84, the drum 83 rotates in harmony with the wrapping action of the band. This makes the braking engagement more intimate, retarding the rotation of reel 21 more quickly than that of reel 20. Thus, the latter gains on reel 21 as the reels slow down, preventing an overrun or piling up of film from reel 21.

In case the film is to be rewound on reel 21, the rocker pedal is tilted in the counter-clockwise direction. In such event the wire shaft 52 pushes the motor 30 to the left—as seen in Fig. 2—imparting a reversed drive to the reel 21. Henceforth the same winding and braking functions apply as before, except that the braking effect on the reels is reversed.

It will now be apparent that the improved winding machine—for film or tape—has a number of advantageous features. First, the application of the motor drive to either reel is by means of a single manual control applicable at will to impart any desired speed to the winding reel. Further, the drive is selected and engaged by a mere pendulum swing of the motor through simple belt transmission means. Further, the braking mechanism is directed for simultaneous and uniform application to the braking elements of the reels. Further, these elements are designed in a manner to automatically increase the braking effect on the paying-out reel, so that the yield of film from the same may not exceed the rate at which it is drawn by the winding reel. Further, the greater portion of the mechanism is installed in a housing and therefore protected against dust and interference by external objects. Finally, the mechanism is of a simple nature and follows well-established mechanical principles.

While I have described the invention along specific lines, various minor changes or refinements may be made therein without departing from its principle, and I reserve the right to employ all such changes and refinements as may come within the scope and spirit of the appended claims.

I claim:

1. A film winding machine comprising a support, a pair of parallel shafts carried by the same, a pair of reels mountable on the shafts and adapted for winding of film from one on the other, a motor between the shafts and suspended from the support in pendulum fashion, belt drives from the motor to the shafts, means for swinging the motor to tension one or the other of said belt drives for driving the corresponding reel, brake means for the shafts, a mechanism between the shafts and normally effective by weight to apply said brake means, and other means actuated by the swinging movement of the motor to raise said weight and induce the release of the brake means.

2. The structure of claim 1, said mechanism involving a weighted bar and motion transmitting connections to said brake means, and lifting means for said weighted bar actuated by the swinging movement of the motor.

3. The structure of claim 1, said mechanism involving a weighted bar and motion transmitting connections to said brake means, a cross-bar carried by the motor at a point below its pivot, terminal idler pulleys carried by said support at points above the end of the cross-bar, an intermediate pulley carried by the support at a point between the terminal pulleys, cables extending from the intermediate pulley and trained over the terminal pulleys to connect with the respective ends of the cross-bar, and a third cable wound on the intermediate pulley and connecting with said weighted bar.

4. The structure of claim 1, said brake means involving drums on the shafts and U-shaped bands receiving the drums, the outer ends of the bands being secured fixedly to the support, the inner ends thereof being secured to said mechanism, and the same comprising links connected between said weighted bar and the inner ends of said bands whereby to draw upwardly on such inner ends when the weighted bar descends and allow such inner ends to slacken when the weighted bar is raised.

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