United States Patent [19]

Burth

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[45] ***Dec. 25, 1973**

[54] **SUPPLY AND TAKE-UP SYSTEM FOR FILM AND THE LIKE**

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[*] Notice: The portion of the term of this patent subsequent to May 9, 1989, has been disclaimed.

[22] Filed: **Nov. 3, 1971**

[21] Appl. No.: **195,228**

Related U.S. Application Data

[62] Division of Ser. No. 874,334, Nov. 5, 1969, Pat. No. 3,661,337.

[30] **Foreign Application Priority Data**

Oct. 18, 1964 Germany ..... P 19 52 592.9

[52] **U.S. Cl.** **242/55.18,** 242/75.3, 352/128

[51] **Int. Cl.** **B65h 17/48**

[58] **Field of Search** ..... 242/55.18, 55.19 R, 242/75.3; 352/128

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Primary Examiner—Billy S. Taylor
Attorney—Karl F. Ross

[57] **ABSTRACT**

A pair of coaxial horizontal disks, driven by respective motors, respectively support a supply coil and a take-up coil of a film strip passing through a projector on its way from the first to the second disk. A central cut-out in the first disk accommodates the pivot of a lever whose free end has a bifurcation engaging a portion of the unwinding film strip formed into a loop by a pair of rollers disposed in the cutout downstream of that bifurcation. If the loop tightens or expands because of insufficient or excessive relative unreeling speed, the lever is deflected in one direction or the other to actuate one of two sensitive switches in a manner modifying the speed ratio of the two motors to restore the normal shape of the loop whereby the lever returns to a centered position.

12 Claims, 10 Drawing Figures

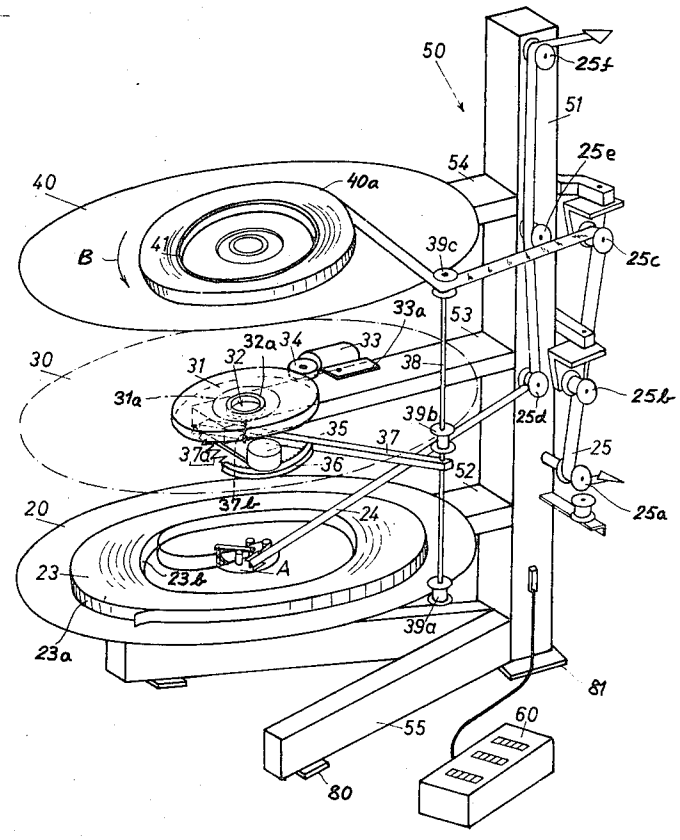


Fig.1

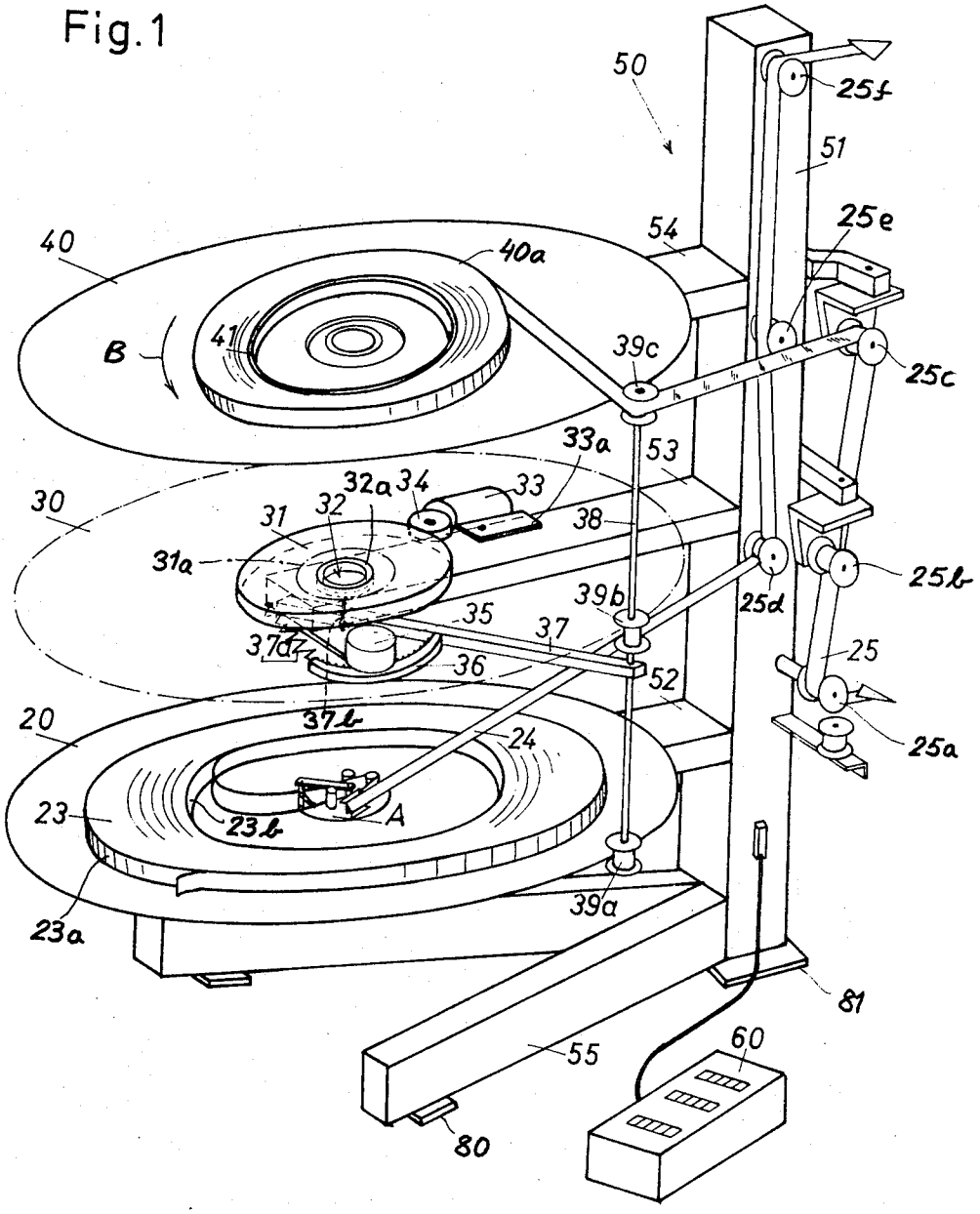

50
25f
51
25e
54
40
40a
41
B
39c
25c
33a
53
30
32a
34
33
31
32
38
31a
25b
39b
25d
35
37
37d
25
36
52
37b
20
24
25a
23
23b
A
23a
39a
81
55
60
80

Fig. 2

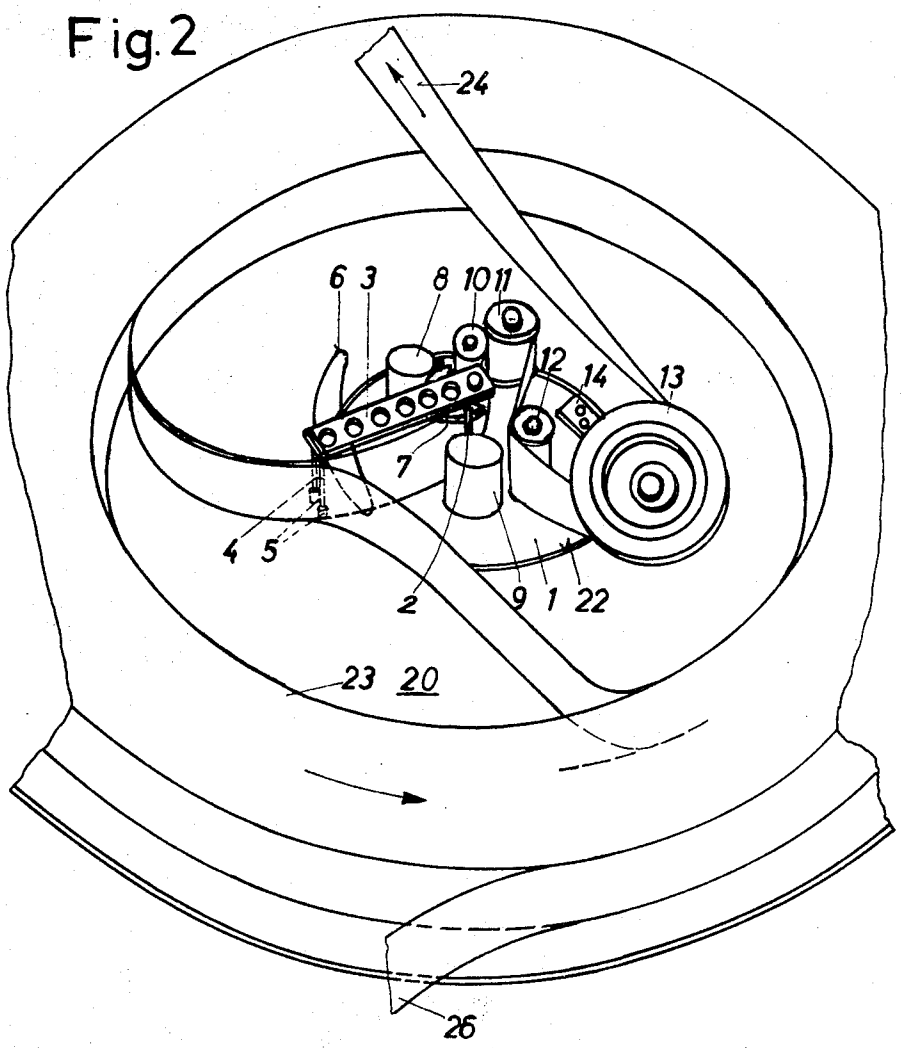

24
6
3
8
10
11
12
14
13
7
4
5
2
9
1
22
23
20
26

Fig. 7

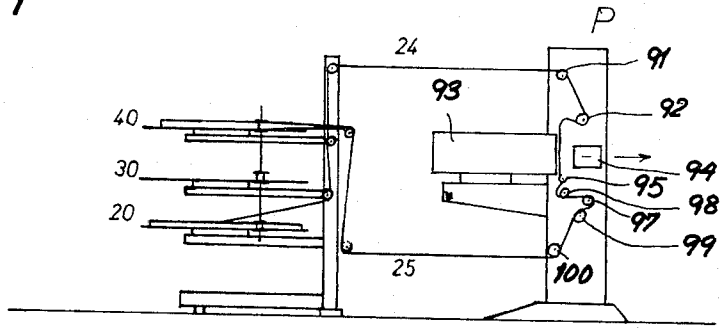

P
24
91
93
92
40
30
20
94
95
98
97
99
25
100

Fig.3

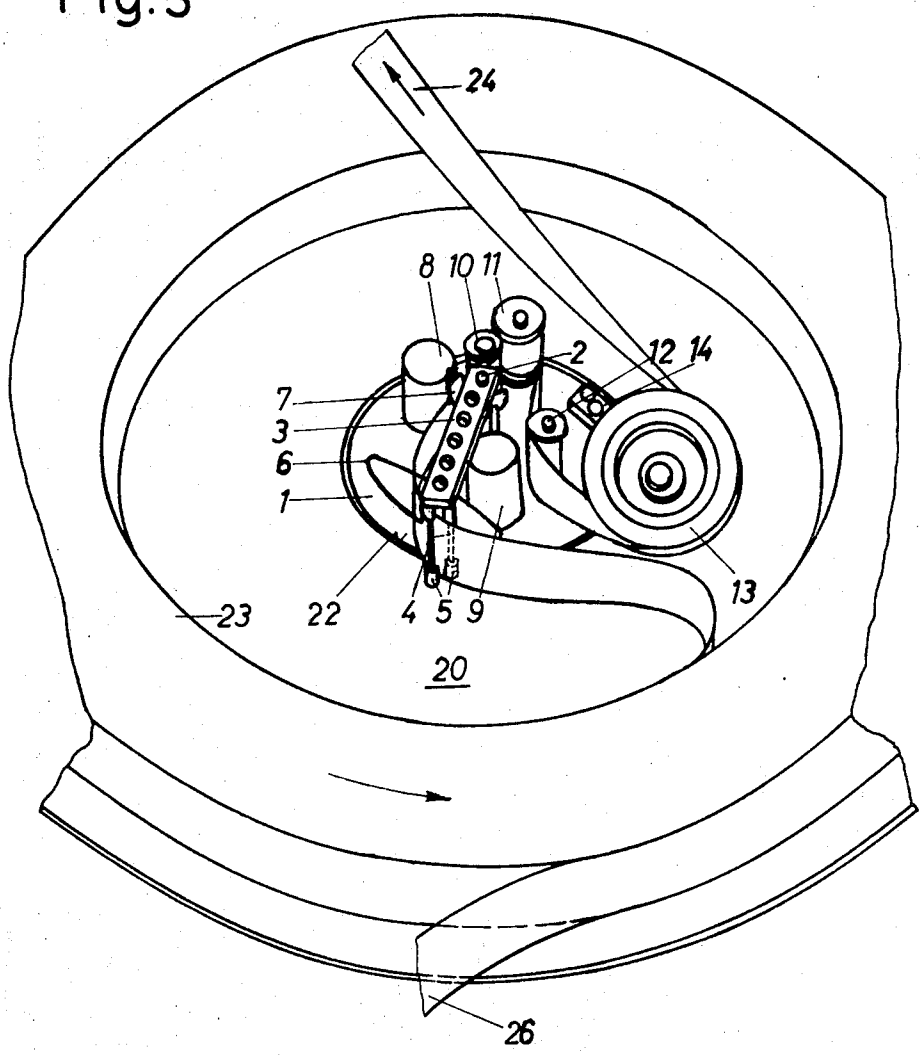


Fig. 4

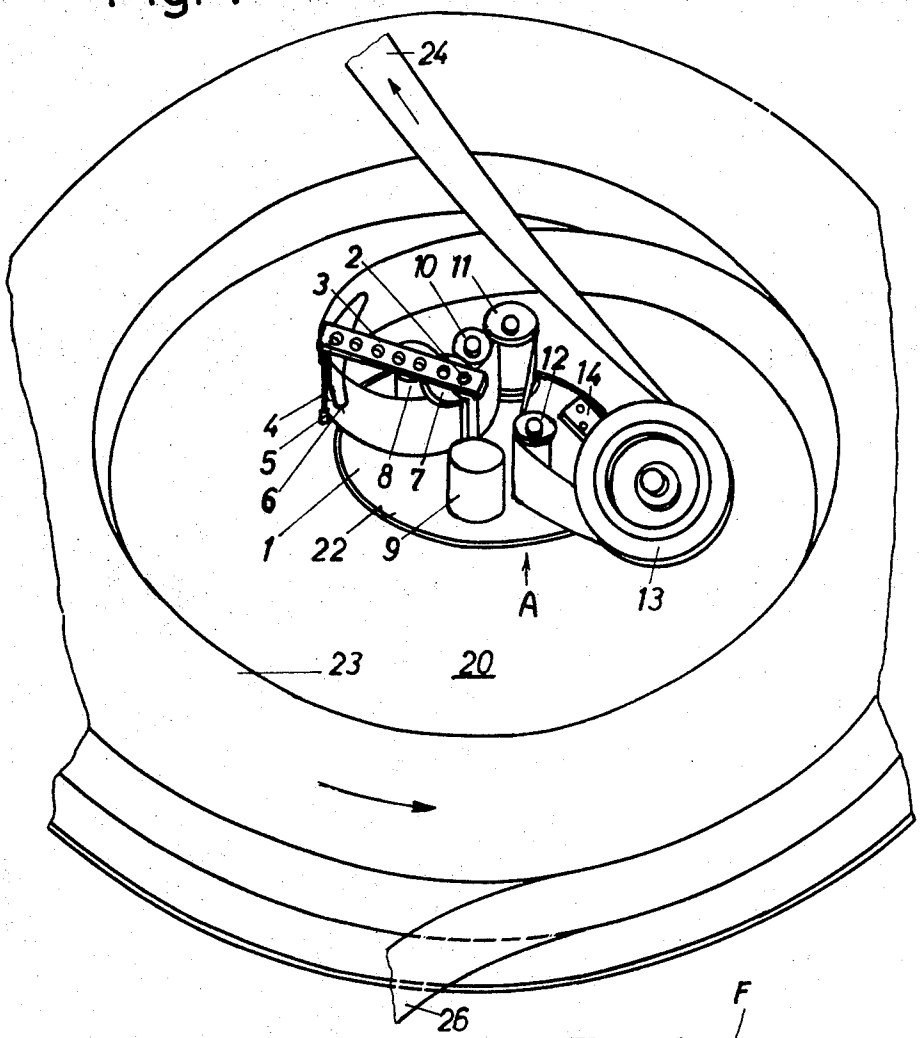


Fig. 5

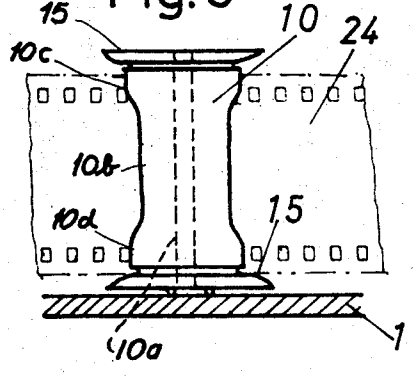
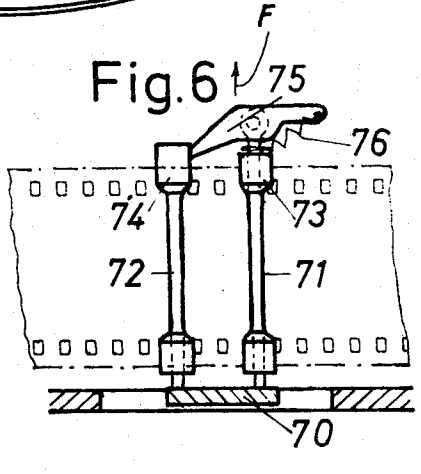


Fig. 6



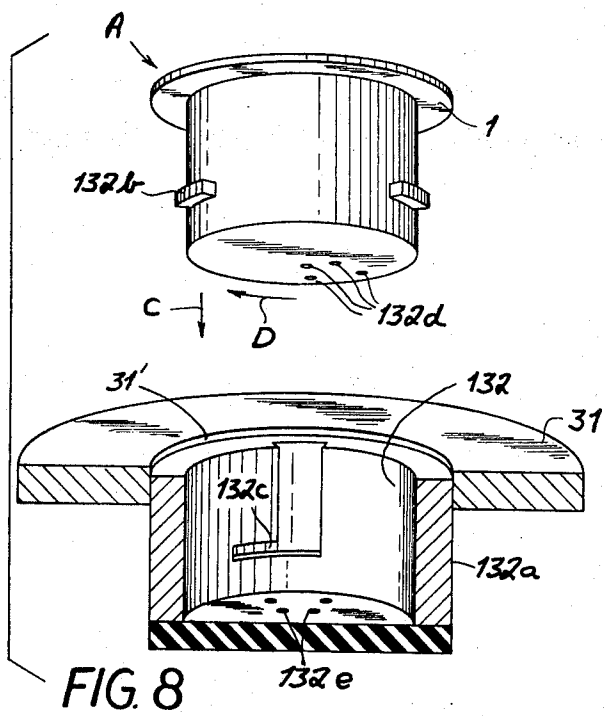


FIG. 8

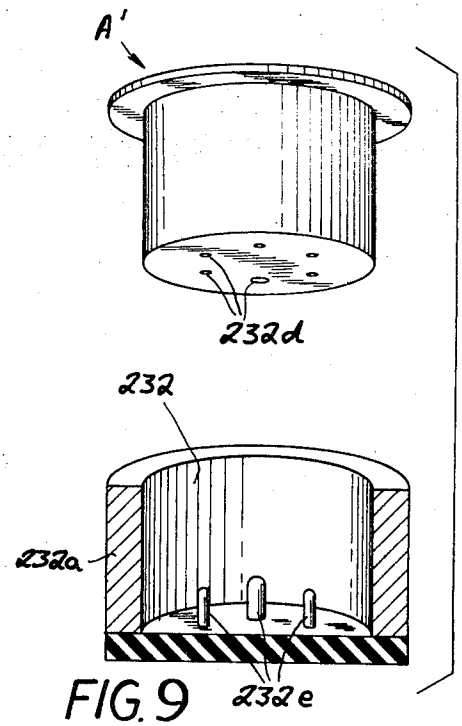


FIG. 9

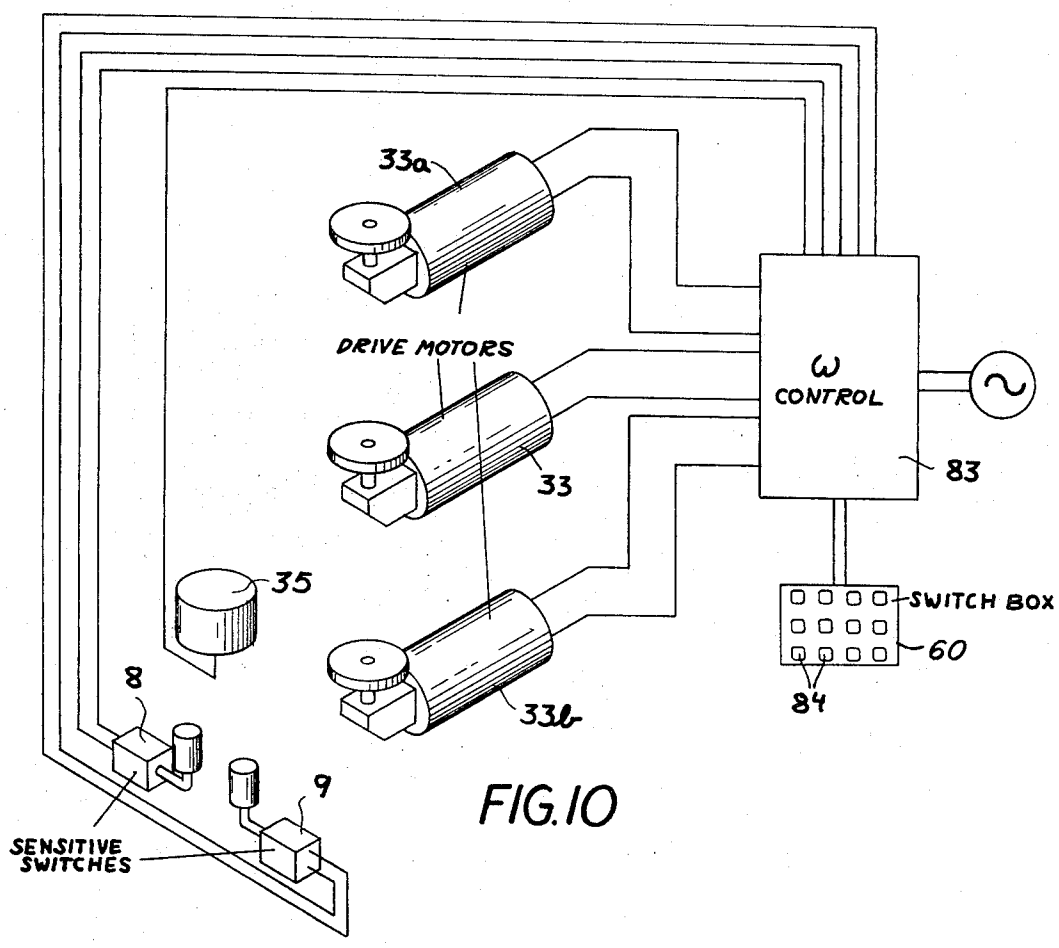


FIG. 10

SUPPLY AND TAKE-UP SYSTEM FOR FILM AND THE LIKE

CROSS-REFERENCE TO OTHER APPLICATION

This application is a division of my prior application Ser. No. 874,334 filed Nov. 5, 1969, now U.S. Pat. No. 3,661,337.

FIELD OF THE INVENTION

My present invention relates to a film supply and take-up system for motion-picture or other form of presentation and, in general, for any system in which a continuous film, band, foil or tape is drawn from a supply coil and returned to a coiled condition after use or processing.

BACKGROUND OF THE INVENTION

In motion-picture theaters and display systems for commercial and noncommercial purposes and in other arrangements in which a substantially continuous film, band or tape is to be drawn from a supply coil, used for projecting images upon a screen or displaying images in some other fashion, and thereafter returned to a coiled condition preparatorily to reuse, it has heretofore been the general practice to provide a double-reel system in which the film is drawn from the periphery of the supply reel, passed through a motion-picture projector, and recoiled progressively outwardly upon a take-up reel.

This system has numerous disadvantages, including the need for a rewind step by which the film on the take-up reel is replaced by reversal of its direction of movement upon the supply reel. The need for a rewind step arises from the fact that the beginning of the film must lie on the external periphery of the supply reel from which the film is originally drawn, but the take-up reel receives the film in the opposite order whereby the end lies upon the external periphery. Hence to prepare the film for reuse, it is customary to provide a rewind step in the film-display system.

A further disadvantage of earlier systems is that they are generally unsatisfactory for providing substantially uninterrupted display of long-duration presentations requiring several reels of film. The reel-changing procedure of conventional motion-picture apparatus necessitates an interruption at the end of one reel which may be accompanied by a prolonged delay as the first portion of the film is rewound. To minimize these disadvantages in the earlier systems, it has been necessary to provide two or more projectors, each fully equipped with a set of reels, and means (such as marks on an initial portion of the film) for indicating to an operator or some automatic device the impending termination of the first part. At an appropriate time, the first projector is cut off and the second projector started, hopefully without interruption or with a minimum of such interruption.

Yet another disadvantage of conventional film-display systems is that they are incapable of preventing adhesion between turns of the film strip when numerous segments are spliced together with the aid of adhesives or other bonding agents; it is not uncommon for successive turns of a film in contact with spliced zones to adhere to adjacent turns. As a result, the separation of the turns from one another is discontinuous or sporadic with consequent interruptions of the presentation and possible even damage to the film. Another source

of adhesive attachment of one turn to another is the electrostatic effect frequently encountered with films and especially significant because of the large surface area, low electrical conductivity and repeated high-rate displacement of the film in frictional environments. Electrostatic charge may build up at the surfaces of the film to a point that successive turns are not readily separable from one another by conventional reel systems. Moreover, even high-moisture conditions prevalent in the environment of a film projector, or in the atmosphere at which the film is stored, may contribute to the adhesive-type bonding of one turn of the film to an adjacent turn.

Finally, a disadvantage of conventional systems also resides in the fact that the peripheral withdrawal of a continuous film strip from the periphery of a coil, with the supply reel retarded by friction or the like, gives rise to sliding friction at the interface between the turns of the coil and between the unwinding strip and the remainder of the supply on the reel. Such frictional contact may result in damage to the emulsion surface of the film, this damage being enhanced by withdrawal systems in which the film is led between a pair of pressure rollers or the like to the framing and projector portions of the apparatus.

OBJECTS OF THE INVENTION

It is, therefore, the principal object of the present invention to provide an improved reel system for motion pictures and the like wherein the aforementioned disadvantages are avoided.

A more specific object of the invention is to provide a device or system for the withdrawal of a film band from a film coil, and for reforming the coil after projecting of the film, which minimizes frictional deterioration of the image-carrying or emulsion surface of the film.

Another object of the instant invention is to provide a film supply and take-up arrangement wherein the effects of adhesivity from any of the sources mentioned above can be minimized.

It is a further object of my invention to provide an improved motion-picture projector system with a film supply and take-up arrangement affording rapid interchange of the supply coils, uniform supply and take-up of the film and total elimination of a separate rewind step.

It is also an object of my invention to provide a film supply and take-up arrangement for the purposes described which will minimize the danger of tearing of the film.

SUMMARY OF THE INVENTION

The reel arrangement for motion-picture film and the like according to the present invention accomplishes the aforementioned objects by providing supply and take-up devices in the form of horizontal disks or coil-carrying plates, preferably disposed one above the other, rotatably mounted upon horizontal arms extending from a common vertical support. In the center of one of these plates, I provide a film pay-out mechanism adapted to draw the band from the supply coil along its inner periphery, i.e., progressively outwardly, and to feed the band to a projector via suitable deflecting and guide rollers, the pay-out mechanism being fixed at the center of the disk switch, according to the invention, may be rotated by a drive motor or permitted to rotate

in accordance with the rate of withdrawal of the band. At the other plate, the strip returning from the utilization device is coiled progressively outwardly by rewinding it into a coil, the take-up plate being rotated essentially in the same sense as the supply plate.

According to a specific feature of this invention, the film coil contacts the supply or take-up plate only with its underside, by contrast with prior-art reels which confine the coil between two side members. Furthermore, a hub ring which may be provided on the take-up plate to facilitate rewinding can be removed to permit access to the inner end of the film when the latter is to be drawn through the projector from that plate now acting as a supply station. Hence the take-up and supply reels need not be removed, separate rewinding of the film is unnecessary and friction resulting from excessive confinement of the film coil is eliminated.

Still another feature of this invention resides in the provision of means for driving the supply coil at a rate proportional to the rate at which the film is payed off the inner periphery of that coil, thereby ensuring a minimum of relative movement between the withdrawing film band and the remainder of the coil. The reduced friction eliminates the possibility of tearing or damage to the image-carrying emulsion of the film. Moreover, I provide at the central pay-off device a sensing arrangement which monitors the position of a loop formed by this film as it passes from the supply coil to the pay-off device, the sensing means operating an electrical circuit which includes speed-regulating means for changing the angular velocity of the coil-carrying plate to maintain the proper tension and/or an optimum pay-off rate of the film.

At the take-up coil, according to this invention, another motor drives the take-up plate or disk which is temporarily provided with the ring-shaped core about which the strip is rewound. At least two coil-carrying plates are provided although best results are obtained when three generally radial horizontal arms are employed, each with its own friction-type drive for a turntable carrying the coil plate and adapted to serve as the supply or the take-off station. At each station, there is provided a central wall into which the pay-off device may be inserted for interchangeable use of all of the stations. In the arms and on the pay-off device, I provide mating electrical contact means for connecting the sensing switches of the pay-off device with a speed-control mechanism and at the same time connecting that mechanism to the appropriate electrical drive motor of the coil station. To change over a take-up station to a supply station, e.g., for repetition of the program or presentation, it is simply necessary to remove the winding hub or core of the take-up coil and place it upon one of the other coil plates, remove the pay-off device from the previous supply station and insert it into the well to the center of the coil of the previous take-up station, and proceed to thread the film through the projector, etc.

A further feature of the invention resides in the provision of a speed-controlling mechanism responsive to the radius of the coil so as to constitute a multiplier for the angular velocity in order to maintain the peripheral speed of the coils constant during film supply and film take-up. For example, as the inner periphery progresses outwardly on the supply coil for a given angular velocity of the coil-carrying plate, the peripheral speed will increase unless compensatory means are employed to maintain the peripheral speed and, therefore, the film-transport speed constant. To this end, I provide for all of the coil-carrying plates a vertical rod disposed alongside the film plates and mounted upon the support or the arms for swinging movement, preferably about the common vertical axis of the film plates, to control the speed. The rod carries at each plate level a deflecting pulley or sprocket about which the film running to the corresponding take-up coil may pass to maintain the appropriate speed for a given film tension. The arm swingably supporting the rod is coupled with a rotary-speed control (variable autotransformer) whose function has been described earlier. The control system of the apparatus of the present invention includes a push-button unit which serves to enable switching of the film-plate motors and control of the speed thereof. The circuitry preferably permits the pushbutton assembly to connect the rotary-speed control of the rod selectively to the several motors. Furthermore, the plug-and-jack arrangement of the pay-off device and its sensing or monitoring means and the control system may be so connected that shifting the pay-off device from one well to another simultaneously connects the appropriate motor or motors in the electrical circuit.

According to still a further feature of this invention the upright support for carrying the film plates includes a column disposed outside the film plates and provided with a plurality of mutually parallel horizontal, vertically spaced arms whose ends are provided with the turntables and wells mentioned earlier and upon which the film-plate motors are mounted. The film plates themselves may be placed upon and screwed down to the turntables while the column or post serves as a support for a number of guide rollers designed to lead the film to and withdraw the film from a projecting system. The post may, in turn, be mounted upon feet, preferably extending beneath the film plates.

BRIEF DESCRIPTION OF THE DRAWING

The above and other objects, features and advantages of the present invention will become more readily apparent from the following description, reference being made to the accompanying drawing in which:

FIG. **1** is a diagrammatic perspective view of the apparatus according to the invention, parts being removed for clarity;

FIG. **2** is a top perspective view, drawn to an enlarged scale, showing a monitoring lever of the pay-off device in its normal position and operating as an adhesion-breaking mechanism;

FIG. **3** is a view similar to FIG. **2**, but illustrating the lever in a position corresponding to excessive speed of the supply disk;

FIG. **4** is a view similar to FIG. **3** wherein, however, the lever is shown in a position corresponding to insufficient rotary speed of the supply disk;

FIG. **5** is an elevational view of a guide roller of the pay-off device;

FIG. **6** is a view of the sensing or monitoring lever according to a specific feature of this invention;

FIG. **7** is a diagram illustrating the apparatus of the present invention in combination with a projector;

FIG. **8** is an exploded perspective view, partly in section, illustrating one form of connection between the pay-off mechanism and a receiving well therefor;

FIG. **9** is a view similar to FIG. **8**, illustrating a modification; and

FIG. 10 is a diagram of the control system of the apparatus.

SPECIFIC DESCRIPTION

In FIG. 1, I show a film-supply and take-up apparatus for the film of a projector P represented in diagrammatic form in FIG. 7 and designed for use in a motion-picture theater or the like.

The apparatus comprises a support 50 composed of a vertical column 51 carrying arms 52, 53 and 54 extending parallel to one another and located one above the other to lie in respective horizontal planes along a common vertical plane.

The base of the support 50 is constituted by a pair of legs 55 which diverge from one another away from the column directly below the arms 52, 53 and 54 so as to be substantially codirectional therewith.

The center of gravity of the unit preferably lies above the legs 55 which, along with the column 51, have feet 80 and 81. Each of the arms 52, 53 and 54 is adapted to carry a respective film plate or disk 20, 30, 40, the plate 30 being shown in phantom lines so that the structure therebelow is more readily ascertainable.

In the system as illustrated in FIG. 1, the lower plate or disk 20 constitutes the supply plate and carries a reel 23 of film, the outer periphery of the reel or coil being represented at 23*a* while its inner periphery is shown at 23*b*. The coil 23 rests upon the disk 20, its upper side being untouched by any mechanical means.

The top plate 40 carries a take-up reel or coil 40*a* which is being wound upon a movable cylindrical ring-shaped hub or core 41 from the return stretch 25 of film as the plate 40 and the coil 40*a* are rotated in the direction of arrow B. From the drawing, it will be apparent that the outgoing stretch 24 of film is drawn from the inner periphery 23*b* of the supply coil 23 while the return stretch 25 is fed to the outer periphery of the take-up coil 40*a*.

To carry out the film-transport process, at least two plates (e.g., 20 and 40) must be used at any time and with removal of, say, the intermediate plate 30. However, it is desirable to provide the further plate 30 to accommodate, for example, a further supply coil when film change-over is desired. In this case, plate 30 will carry the next supply coil and, as the last of film from coil 23 is delivered by the pay-off device A, that device is swiftly inserted into the plate 30 which thereupon acts as the supply plate. Plate 20 may then be connected as the take-up plate for the fresh film while the remainder of the original film is wound up on plate 40. However, when it is simply desired to rerun the program, plates 20 and 40 are functionally interchanged without changing the actual position of the coil, as will be apparent hereinafter, by a pushbutton on a switch-box 60.

The plates 20, 30 and 40 are fixed (e.g., by screws or a thread) to respective turntables 31 rotatably carried at the ends of arms 52–54 but illustrated only for the arm 53. It will be understood that each of the arms 52 – 54 is formed with a corresponding turntable, well and drive arrangement. Each turntable 31 is rotatably mounted on a bearing represented in dot-dash lines at 31*a* on the arm and is frictionally engaged at its outer periphery by a drive disk 34 of a motor 33 bolted by an attachment plate 33*a* to the arm. The friction wheel 34 may be geared to a speed less than that of motor 33 and may be held against the turntable 31 by any conventional (e.g., spring) means desired.

The illustrated turntable 31 is rotatable about a cylindrical bushing 32*a* forming a well 32 in which the pay-out mechanism A can be nonrotatably supported by the arm 53. While the pay-out device A is here shown to be mounted in the well of the supply plate 20, it will be understood that it may be equally inserted into the wells of each of the other two plates which all have drive motors and well structures as described in connection with the plate 30.

Beneath the central support arm 53, I provide a radially extending swingable arm 37 which is pivoted on a pin 37*b* at, preferably, the common center of rotation or axis of the plates 20, 30 and 40. The arm 37 carries an arcuate rack 36 which is swingable with the arm and engages a pinion attached to the control shaft of an adjustable transformer known as Variac (e.g., a variable autotransformer) represented at 35. A spring 37*a* urges the bar 37 in the clockwise sense (as seen from above) about its pivot 27*b*. The arm 37, moreover, extends beyond the outline of the film plates 20, 30 and 40 and carries, at its free end, a vertical rod 38 extending the full height of the plate assembly. Freely rotatable on the rod 38 are three idler pulleys 39*a*, 39*b* and 39*c* respectively located at the levels of plates 20, 30 and 40. The return stretch 25 of the film, shown as passing from the projection booth over a horizontal idler 25*a* located upon the column 51 close to the lowermost arm 52, hugs one of the pulleys 39*a*, 39*b*, 39*c* in running to the take-up plate. In the arrangement illustrated in FIG. 1, the film passes around the idler 39*c* before merging with the take-up coil 40*a*. Each of the idlers 39*a*, 39*b*, 39*c* is associated with a respective fixed idler 25*a*, 25*b* and 25*c* mounted upon the post 51 in vertically spaced relationship with a horizontal axis of rotation. The three rollers 25*a*, 25*b* and 25*c* are horizontally spaced from the stack of plates 20, 30 and 40 by progressively greater distances. The spring 37*a*, of course, provides the necessary tension for the film stretch 25 and at the same time permits the rod 38 and the arm 37 to swing from their initial position, with reference to Variac 35 as the radius of the take-up coil 40*a* increases. The angular velocity of the take-up motor, to which Variac 35 is connected by switches in box 60, is adjusted accordingly.

As illustrated in FIG. 8, the pay-off device A is designed to be received in the well (here designated 132) of a stationary hub member 132*a* traversing a central cutout 31′ of the respective turntable. To permit the fixed (i.e., nonrotatable) sensing device to be anchored effectively in the well, I may provide a bayonet coupling in the form of mutually interfitting bayonet formations 132*b* and 132*c* adapted to lock the pay-out device A in place when that device is inserted axially (arrow C) and then given a slight twist (arrow D). At the bottom of the device A, there are provided a plurality of electrical contacts 132*d* which, when the device A has been properly locked in the well, engage complementary contacts 132*e* to complete an electrical circuit for the sensing means of the pay-out device. Another form of coupling is represented in FIG. 9 in which member 232*a*, fixed to the arm 52, 53 or 54, defines a well 232 within which a plurality of plug contacts 232*e* are provided for insertion into jack openings 232*d* in the base of the pay-out and sensing unit A′.

The pay-out and sensing unit A or A' is inserted within the well of the supply coil or plate as shown for the supply coil **23.** The last or outermost turn of the film, constituting the end of the program, is represented at **26** in FIGS. **2 – 4.**

An important feature of this invention resides in the use of the pay-out device to control the speed of the coil drive so as to minimize stress and friction. For this purpose the unit A includes, as best seen in FIGS. **2 – 4,** a lever **3** pivotally mounted at **2** upon a base or support plate **1** and swingable horizontally about this pivot while its free end extends slightly beyond the periphery of the plate **1.** In FIGS. **2 – 4,** the stationary unit A is shown to be received in a cutout **22** of disk **20.**

At its free end, the lever **3** carries a pair of pins **4** having at their extremities respective enlargements **5** designed to confine the film band. The gap between the enlargements of the pins may have a width several times the thickness of the film **24.** Only the outer film edges, formed with the sprocket holes, will contact the pins while the remainder (carrying the image) stays out of contact with these elements. In this fashion it is possible to avoid damage to the photographic layer.

At the free end of the lever **3,** I also provide a wire bail or loop **6** which extends substantially to both sides of the lever **3** in the horizontal direction and which has a center of curvature located at the center of the mounting plate **1** so that the wire **6** corresponds in curvature to the circumference of the mounting plate. The function of this wire guide is shown in FIG. **2;** an inner turn of the coiled film strip clinging to an adjoining turn may be separated therefrom by one of the pins **4,** the wire **6** serving to conduct electrostatic charges from the separated layers and restrict further adhesion.

As is also apparent from FIGS. **2 – 4,** the support plate **1** carries three rotatable idler or deflecting rollers **10, 11** and **12** serving to guide the film straddled by the pins **4** in a loop. From roller **12** the film is led to an inclined roller **13** affixed at **14** to the support plate so that the film may pass in a straight line to an associated idler **25***d* (FIG. **1**) carried by the column **51.** A plurality of such idlers are provided for the supply stretch **24** of the film as shown at **25***d*, **25***e* and **25***f*.

The length of film **24** drawn from the inner periphery of the coil **23** passes substantially along the full length of the lever **3** and is deflected in the region of the pivotal axis **2** of this lever to the idler rollers **10, 11** and **12** in a sharp bend, preferably extending through an arc of about 270° or more. Thereafter the film is passed to the inclined idler **13** with the aid of which it is withdrawn from a center of the supply plate.

To guide the film **24,** it has been found advantageous to provide means at least at the first pulley **10** and preferably at all the pulleys or rollers **10 – 13** by which the film is retained against upward or downward movement along the body of the pulley. These pulleys may, therefore, be given the spool-shaped configuration shown in FIG. **5.** Here the body of the pulley is shown to be mounted upon a shaft **15***a* and to have a cylindrical portion **10***b* widening into annular bulges **10***c* and **10***d* at the opposite axial ends of the body substantially at the sprocket holes of the film. A pair of disk-shaped shields **15** with rounded edges are fixed to the body and function as outwardly extending annular flanges to confine the film **24** against upward and downward movement. The lower shield **15** prevents the film from contacting the mounting plate **1** and thus reduces frictional damage.

The monitoring mechanism of the pay-out device A comprises a pair of sensitive switches **8, 9** (e.g., microswitches) which are carried by the plate **1** on opposite sides of a switch-operating plate **7** upon the lever **3.** FIG. **2** shows a normal loop configuration by which the lever **3** is held midway between the sensitive switches **8** and **9** without operating either of them. However, an increase in the rotary speed of the coil **23** beyond its normal lever (FIG. **3**) tends to deflect the entrance leg of the loop so that the lever **3** swings counterclockwise and actuates the switch **9,** thereby reducing the speed of the motor. Should the motor speed be reduced excessively, the loop trails behind (FIG. **4**) and switch **8** is actuated by the oppositely swinging lever **3** to speed up the coil-driving motor.

In FIG. **6,** I have shown an arrangement for retaining the film **24** between the pins of the underlying lever **70** replacing the overlying lever **3.** In this case the pins **71** and **72** are shown to rise from the lever **70** and to have free ends at the top between which the film may be inserted. A latch **75** is swingable to block withdrawal of the film in the direction of arrow F. A spring **76** biases the locking pawl **72** in the clockwise direction so that insertion of the film permits deflecting of the pawl inwardly to clear the inserted film. Once the film is inserted, pawl **75** swings back to its locked position against the free end **74** of the pins **72.** In the system of FIGS. **1 – 5,** by contrast, the film must be threaded between the depending pins **4.** In either case, these pins form a transverse bifurcation on the free end of lever **3** by which this lever is in two-way positive engagement with a portion of the looped film strip upstream of the two closely spaced guide rollers **10, 91.**

From FIG. **10** it can be seen that the sensitive switches **8** and **9** of the pay-out assembly A energize a rotary-speed controller **83** for the unwinding of the film which may be included in the switchbox **60** and may be provided with pushbuttons **84** as illustrated in FIG. **10.** The regulator **83** may, of course, be constituted by a variable autotransformer (Variac) whose shaft is driven by a servomotor under the control of microswitches **8** and **9** in opposite senses as long as either of these switches is actuated. The corresponding motor **33, 33***a* or **33***b* is then operated accordingly. Removal of the pay-out device A from one well, and its insertion in another, connects the appropriate drive motor to the controller which, in turn, frictionally switches the plates and the variable autotransformer **35** as mentioned earlier.

As can be seen from FIG. **7,** the film entering the projector P as the pay-out stretch **24** passes via sprockets **91** and **92** in front of the lamp and condensing lens assembly **93** of the projector P whose objective lens is shown at **94.** Subsequently, the film passes via sprockets **95 – 100** to become the return stretch **25.** After completion of the film showing and for preparation for the next showing, the unit A is removed from the plate **20** and inserted in plate **40** in the event that no second unit A is available. The core **41** is then removed from coil **40***a* and placed upon plate **20,** the appropriate but-

ton in the switchbox 60 is depressed and feeding of the film from the new supply coil proceeds.

I claim:

1. An apparatus for continuously controlling the supply and take-up of a flexible strip, comprising:
a support;
a pair of generally horizontal coil-carrying disks rotatably mounted on said support;
first and second drive means respectively coupled with said disks for rotating same;
a pay-out device nonrotatably carried on said support in a central cutout of one of said disks adapted to have mounted thereon a supply coil of a strip to be unwound, said device including guide means for forming said strip into a substantially horizontal loop adjacent a face of said one of said disks and for directing said strip generally toward the other of said disks by way of a utilization device;
wind-up means on said other of said disks for coiling up the strip leaving said utilization device;
a lever;
pivot means in said cutout mounting said lever on said support adjacent said guide means in a normal position with freedom of swinging in two directions from said normal position about an axis perpendicular to said face, said lever having a free end provided with strip-engaging means entrainable in either of said directions by a portion of said loop upstream of said guide means subject to dislocation upon a deformation of said loop indicative of an abnormal rate of rotation of either of said disks; and
monitoring means positioned on said support for actuation by said lever, in response to a deviation thereof from said normal position, for modifying the operating speed of one of said drive means in a sense tending to restore said normal position.

2. An apparatus as defined in claim 1 wherein said monitoring means comprises a pair of switches positioned in said cutout.

3. An apparatus as defined in claim 1 wherein said disks are coaxially mounted on said support.

4. An apparatus as defined in claim 1 wherein said guide means comprises a plurality of idler rollers forming said loop and an inclined roller for guiding said strip upwardly from the interior of said supply coil.

5. An apparatus defined in claim 1 wherein said strip-engaging means comprises a pair of pins positioned to straddle said strip.

6. An apparatus as defined in claim 5 wherein said lever overlies said face and said pins extend downwardly from said lever.

7. An apparatus as defined in claim 5 wherein said pins extend upwardly from said lever and define a gap at the upper ends of said pins through which said strip can be threaded, said device further comprising latch means at said gap for closing same to prevent escape of the strips from between said pins.

8. An apparatus as defined in claim 5 wherein said pins are provided with enlargements at their opposite ends adapted to confine said strip therebetween.

9. An apparatus as defined in claim 1 wherein said lever is provided with an appendage for separating each turn of the strip drawn from the inner periphery of said supply coil from any adherent adjoining turn and for removing static electric charges from the turns separated thereby.

10. An apparatus as defined in claim 4 wherein at least one of said idler rollers is provided with an outwardly extending strip-supporting peripheral flange.

11. An apparatus for continuously controlling the supply and take-up of a flexible strip, comprising:
a support;
a pair of parallel coil-carrying disks rotatably mounted on said support;
first and second drive means respectively coupled with said disks for rotating same;
a pay-out device nonrotatably carried on said support in a central cutout of one of said disks adapted to have mounted thereon a supply coil of a strip to be unwound, said device including guide means for forming said strip into a loop parallel to and adjacent a face of said one of said disks and for directing said strip generally toward the other of said disks by way of a utilization device;
a lever;
pivot means mounting said lever at one end on said support in a normal position within said cutout with freedom of swinging in two directions from said normal position about an axis perpendicular to said face, said guide means including a pair of closely spaced rollers in said cutout adjacent said pivot means, the other end of said lever pointing away from said rollers and being shaped for two-way positive engagement with said strip at a portion of said loop upstream of said rollers for deflecting said lever in either of said directions upon a deformation of said loop indicative of an abnormal rate of rotation of either of said disks;
monitoring means positioned on said support for actuation by said lever, in response to a deflection thereof from said normal position, for modifying the operating speed of one of said drive means in a sense tending to restore said normal position; and
wind-up means on said other of said disks for coiling up the strip leaving said utilization device.

12. An apparatus as defined in claim 11 wherein said other end of said lever is provided with a transverse bifurcation adapted to straddle said strip.

* * * * *

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,780,959 Dated 25 December 1973

Inventor(s) Willi BURTH

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 9, between lines 4 and 5 (claim 1, between lines 1 and 2) read the following:

-- ply and take-up of a flexible strip, comprising:

a support; --

Signed and sealed this 30th day of July 1974.

(SEAL)
Attest:

McCOY M. GIBSON, JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents

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