This invention relates generally to reel pay-out devices, and more particularly to reel pay-out devices of the tension-controlled type.

Conventional devices of this type to which the present invention relates customarily have a support on which a reel is rotatably journalled for the pay-out of its contents, such as wire or other continuous flexible stock, and a bodily movable guide or dancer roll over which the stock passes and which is normally spring-urged, opposite to the run-off direction of the stock therefrom, into a back-up position from which it will yield forwardly as the stock is put under tension on its draw from the reel. In an effort to maintain a substantially constant pay-out rate of the stock from the reel on its draw from the latter by a constant-speed operated capstan, for instance, it is customary to control the tension in the stock being payed-out to the end of maintaining this tension as uniform as possible, and within permissible limits despite the varying resistance encountered in the draw of the stock from the reel by virtue of the gradually diminishing diameter of the wound stock on the reel and also from other causes. This tension control is commonly in the form of a brake mechanism which is operatively linked with the dancer roll and applies a brake force to the turning reel when the dancer roll backs up excessively on decrease of the tension in the stock being payed-out below a certain minimum.

It is also known to interpose in the operating linkage between the dancer roll and brake mechanism spring means which will cause the brake mechanism to be in its brake action on the reel responsive to variations of the position of the dancer roll over a substantial bodily-motion range of the latter, thereby greatly to minimize surging or hunting of the dancer roll and ensuing undesirability in the tension of the stock being payed-out which may assume such proportions as to cause stock, especially when of relatively low tensile strength, to snap apart. However, while the spring intervention in the operating linkage between the dancer roll and brake mechanism is advantageous for the reason just mentioned, it works a serious disadvantage when the stock does occasionally, and especially at modern high stock pay-out rates, snap apart for any of a number of reasons such as local damage to or a weak spot in the stock, for example, and not necessarily due to low tensile strength of the stock. Thus, if the interposed spring in the operating linkage between the dancer roll and brake mechanism has been selected with a view toward obtaining varying brake action on the reel in response to bodily motion of the dancer roll within a relatively wide range to prevent appreciable hunting or surging of the latter, as by using a spring of relatively high resiliency which has considerable deflection under a given load, then this same spring works a disadvantage and may even create a hazardous condition if the stock being payed-out suddenly snaps apart. In the latter event, this spring will be too weak to compel the brake mechanism to apply to the spinning reel a brake force of sufficient magnitude to stop the same almost immediately after the break in the stock occurs, with the result that the reel will continue to spin for some time after the break occurs and, in consequence, not only whip a broken end of the stock around in a hazardous fashion but most likely also cause some of the stock to become unravelled. On the other hand, if the interposed spring in the operating linkage between the dancer roll and brake mechanism is sufficiently stiff to react with the brake mechanism in compelling the same to apply to the spinning reel a brake force of sufficient magnitude to stop the latter almost immediately after a break in the stock occurs, then the spring is far too unwieldy effectively to prevent highly objectionable hunting or surging of the dancer roll during normal operation of the device.

It is, therefore, an important object of the present invention to provide in a reel pay-out device of this type between the dancer roll and brake mechanism itself an operating linkage which acts not only to compel the mechanism to apply a varying brake force on the reel in response to bodily motion of the dancer roll within a relatively wide range, but acts also, in the event of a sudden break in the stock being payed-out, to compel the mechanism to apply to the spinning reel a brake force which will assuredly stop the reel almost immediately after the break in the stock occurs, thereby not only achieving the highly desirable objective of substantially surgeless response of the brake force on the reel to even sudden variations in the tension of the stock being payed-out, but also greatly minimizing the possibility of stock becoming unravelled on the reel and, more importantly, preventing hazardous whipping-around of a broken stock end by the reel if the stock being payed-out should suddenly snap apart.

It is another important object of the present invention to achieve the aforementioned significant objectives of substantially surgeless response of the brake force on the reel to all normal or even abnormal variations in the tension of the stock being payed-out and a practically sudden stop of the reel if the stock should suddenly break, by providing in the aforementioned operating linkage for loss of motion of the dancer roll relative to the brake mechanism slightly in excess of any desired operating range of the former within which the same may move during normal operation of the device, and interposing in the linkage a spring which is arranged to resist the take-up of this lost motion by the dancer roll with an increasing force best calculated to react with the brake mechanism in compelling the same to apply to the reel a brake force which varies inversely with the tension in the stock being payed-out and substantially prevents hunting or surging of the dancer roll in every event during normal operation of the device. However, this same spring will offer no appreciable resistance to an almost instantaneous surge of the dancer roll, under the urgency of its powerful back-up spring, to the end of its permissible lost motion if the stock being payed-out should suddenly snap apart, whereupon the back-up spring will, through intermediate of the operating linkage, react directly with the brake mechanism and compel the same to apply to the spinning reel a brake force which will assuredly stop the latter almost immediately.

It is a further object of the present invention to achieve in a reel pay-out device of this type with the least handling and in utmost safety, as well as with the simplest possible equipment, by providing a stand in which a reel may removably be journaled for the pay-out of the stock thereon, and which is also tiltable into an elevated pay-out position and into a lower loading position in which an empty reel may be exchanged for a full reel while they are on the floor.

Another object of the present invention is to provide
in a reel pay-out device of this type power means for tilting the aforementioned reel stand into its pay-out and loading positions, thereby even further facilitating the exchange of reels in the device.

A further object of the present invention is to provide in a reel pay-out device of this type for quick and simple association of the aforementioned brake mechanism with, and its equally quick and simple disassociation from, any reel being loaded on and unloaded from the aforementioned reel stand, respectively, by providing the brake mechanism in the form of a brake drum and cooperating brake shoe of which the drum is a separate part of the device to permit its temporary attachment to any reel for the pay-out of its stock in the device, and the brake shoe is by the aforementioned operating linkage connected with the dancer roll, and is so pivotally mounted on the reel stand as to be compelled by its operating linkage and by the tilting of the stand to assume positions in which it is in operative relation with the brake drum on a reel in the stand in its aforementioned pay-out position and is out of the path of the brake drum on a reel being unloaded from or loaded on the stand in its aforementioned loading position, respectively.

Other objects and advantages will appear to those skilled in the art from the following, considered in conjunction with the accompanying drawings.

In the accompanying drawings, in which certain modes of carrying out the present invention are shown for illustrative purposes:

Fig. 1 is a side view of a reel pay-out device embodying the present invention;

Figs. 2 and 3 are top and end views, respectively, of the same device, the end view being partially in section;

Fig. 4 is an enlarged longitudinal section through a prominent link structure of the device, the section being taken substantially on the line 4—4 of Fig. 2;

Fig. 5 is a section similar to Fig. 4, showing the link structure in a different operating condition, however;

Fig. 6 is a fragmentary side view of the device similar to Fig. 1, but showing the same in a different operating condition;

and

Fig. 7 is a fragmentary longitudinal section through a link structure of the device which is modified from that of Fig. 4.

Referring to the drawings, and more particularly to Figs. 1 to 3 thereof, the reference numeral 10 designates a reel pay-out device having as its principal operating units a reel stand 12, operating mechanism 14 thereof, a dancer roll 16, reel brake mechanism 18, an operating linkage 20 between the dancer roll 16 and brake mechanism 18, and a main operating spring 22. These various operating units are mounted on or in a base frame 24 which in the present instance comprise opposite bottom rails or angles 26, cross ties 28 and 30 connecting the bottom rails 26 and secured thereto as at 32 and 34, respectively, opposite side panels 36 and 38 suitably secured to the bottom rails 28, respectively, and cross ties 40 and 42 connecting the side panels 36 and 38 and suitably secured thereto.

The reel stand 12 comprises, in the present instance, spaced arms 44 and 46 having hubs 48 and 50, respectively, which are keyed or otherwise secured to a transverse shaft 52, journaled in spaced bearing brackets 54 and 56 that are suitably secured to and extend between the spaced cross ties 30. The outer ends of the stand arms 44 and 46 are generally fork-shaped, each providing a reel bearing 58 having a semi-cylindrical bearing surface or seat 59 and opposite prongs 60a and 60b the opposing surfaces 64a and 65a of which are continuous with the bearing seat 59 and define an entry passage to the latter for a journal 60 on a reel 62 (Fig. 1). Preferably, the reel bearings 58 in both stand arms 44 and 46 are identical.

The opposite journals 60 on the reel 62 are, in the present example, provided by a conventional mounting adapter unit 64 (Fig. 3) which is interchangeable with other reels. This mounting adapter unit comprises a shaft 66 on which the hub 68 of the reel is rotatable, and opposed journal sections 70 and 72 adapted for the reel bearings 88 in the stand arms 44 and 46, respectively. The journal section 70, which is permanently assembled with and, hence, non-removable from the shaft 66, is formed by an antifriction bearing 74, the inner and outer races of which are mounted on a diametrically reduced end 76 of the shaft 66 and in a roller 78, respectively, of which the latter is fittedly received in the reel bearing 88 in the stand arm 44 and provided with peripheral end flanges 80 which holds the roller against axial movement in its bearing 88. The journal section 72, which for a reason described hereinafter is removable from the shaft 66, is formed by an antifriction bearing 82 (Fig. 3) the inner and outer races of which are mounted on an adapter sleeve 84 and in a roller 86, respectively, of which the latter is identical with the described roller 78 and fittedly received in the reel bearing 88 in the stand arm 46, the peripheral end flanges 88 on the roller holding the latter against axial movement in its bearing 88. The adapter sleeve 84 is slidably received on the adjacent diametrically reduced end 80 of the shaft 66 and bearing against an annular shoulder 92 thereon to prevent axial movement of the shaft 66 relative to the reel stand 12 when the journal sections 70 and 72 are seated in the bearings 88 in the respective stand arms 44 and 46 and rotatably support the reel 62.

On removal of the reel 62 with the mounting adapter unit 64 from the stand 12 in a manner to be described, the unit 64 may expeditiously be removed from the reel while on the floor, by simply sliding the removable journal section 72 from the reduced shaft end 90 and then pulling the shaft 66 with its non-removable journal section 70 from the hub of the reel to the right as viewed in Fig. 3. The removed mounting adapter unit 64 may then be applied to another reel which is to be placed on the stand 12 for the pay-out of its contents, simply by passing the shaft 66 through the hub of the new reel and sliding the journal section 72 onto the projecting shaft end 90.

The exemplary mounting adapter unit 64 also includes an element of the aforementioned brake mechanism 18 in the form of a brake drum 96 which is keyed to the reduced shaft end 76 of the shaft 66 so as to turn therewith. Since the reel of unit 64 is removed from the shaft 66 as explained, the former is releasably engaged with the brake drum 96. To this end, the brake drum 96 has adjustably mounted thereon at 100 a bar 102 which carries a coupling pin 104 that projects into an aperture 106 in the adjacent end flange 108 of the reel (Figs. 2 and 3). It is apparent from the foregoing that the coupling pin 104 will, on mere alignment of the aperture 106 in the reel, be connected with the latter when the mounting adapter unit 64 is assembled with the reel in the aforementioned manner, and will be disconnected from the reel on removal of the unit 64 therefrom. Furthermore, the adjustability of the coupling pin 104 on the brake drum 96 permits the adaptation of the brake mechanism 18 to reels having in one or both of their end flanges coupling apertures 106 at different distances from their axes.

The operating mechanism 14 of the reel stand 12 is adapted to swing the latter into raised pay-out and lowered reel-exchange positions (Figs. 1 and 6) with vertically and rotatably to support a reel for the pay-out of its contents and for exchanging reels, respectively. The operating mechanism 14 comprises a cylinder 110 with a preferably double-acting plunger 112 therein the rod 114 of which is pivotally connected at 116 with the upper
end of a rocker arm 118 the lower end 120 of which is keyed or otherwise secured to the transverse shaft 52 so as to be swingable with the reel stand 12. The cylinder 110 is at its lower end pivotally mounted at 122 on a bracket 124 which is, in turn, mounted on an anchor plate 126 on the rear crossbar 28 of the base frame 24. Ducts 128 and 130 in the cylinder 110, which lead to the opposite ends of the cylinder chamber 132 therethrough (Fig. 1), are connected by conduits 134 and 136 with a manifold valve 138 which when a conduit 140 is connected with a suitable source of operating fluid under pressure, such as compressed air, for instance, and has also a vent opening 142. The valve 138, which is diagrammatically illustrated in Fig. 1, is also provided with a pivoted handle 144 which may be manipulated into three different positions. Thus, when the handle 144 is manipulated into the dotted-line position shown in Fig. 1, the valve will admit compressed air through the conduit 134 into the top end of the cylinder chamber 132 and simultaneously vent the bottom end of the latter through the conduit 134 and opening 142, with the result that the plunger 112 will, through intermediation of its rod 114 and the rocker arm 118, swing the reel stand 12 into its raised pay-out position (Fig. 1) in which the plunger 112 is at the end of its stroke and engages with its end collar 146 the adjacent end of the cylinder 110. Conversely, on depressing the handle 144 into the dot-and-dash-line position (Fig. 1), the valve 138 will admit compressed air through the conduit 134 into the lower end of the cylinder chamber 132 and simultaneously vent the top end of the latter through the conduit 136 and opening 142, with the result that the plunger 112 will, through intermediation of its rod 114 and the rocker arm 118, swing the reel stand 12 from its pay-out position (Fig. 1) in which the plunger 112 is at the end of its stroke and engages with its end collar 146 the adjacent end of the cylinder 110. Conversely, on depressing the handle 144 into the dot-and-dash-line position (Fig. 1), the valve 138 will prevent the escape of air from either end of the cylinder chamber 132 and, hence, lock the plunger 112 in any position therein to which it has been shifted on previous manipulation of the handle either into its dotted-line position or its dot-and-dash-line position.

In accordance with one of the aspects of the present invention, the reel stand 12 and its operating mechanism 14 are arranged to eliminate practically all handling of the reels for their exchange on the stand. Thus, assume that the entire contents of the reel 62 on the stand 12 in its pay-out position (Fig. 1) has been payed-out in a manner to be described, the operator will then manipulate the handle 144 on the valve 138 from its full-line position into its dot-and-dash-line position (Fig. 1) in order to cause the operating mechanism 14 to swing the reel stand from its raised pay-out position toward the floor F until the reel 62 rests on the latter (Fig. 6). The same or another operator may then roll the lowered reel 62 on the floor away from the stand 12 in the direction of the arrow 150 in Fig. 6 and from the constraining confines of the reel bearings therein as the stand 12 is lowered further into the dot-and-dash-line position in Fig. 6 for the full release of the reel therefrom. However, manual rolling of the lowered reel on the floor for its complete removal from the stand 12 is unnecessary if the reel is of sufficiently large diameter to be subjected to a cam-out action by the reel bearings 58 from the lower end of the reel after the reel reaches the floor. This assumes that the operator is and remains within controlling reach of the valve 138 when the stand 12 lowers the reel 62 of the exemplary size shown onto the floor into the full-line position thereon shown in Fig. 6, the operator may leave the valve handle in the dot-and-dash-line position (Fig. 1) in order to compel the stand to swing still lower from the full-line position into the dot-and-dash-line position in Fig. 6. It is during this continued downward swing of the stand 12 that the semi-cylindrical seats 59 and plane continuing surfaces 65 of the reel bearings 58 in the stand arms 44 and 46 cam the respective journal sections 70 and 72 of the reel therefrom, compelling the latter to roll on the floor until its journal sections are clear of the reel bearings. The operator then manipulates the handle 144 of the valve 138 from the dot-and-dash-line position into the full-line position (Fig. 1) in order to lock the stand 12 in the correct position (dot-and-dash-line position in Fig. 6) for the reception of another, full reel of the same size as the released reel 62. The released reel is then further rolled away from its stand 12, and another full reel is rolled on the floor toward the lowered stand into the same position as the indicated dot-and-dash-line position of the reel 62 in Fig. 6. The mounting adapter unit 64 may in the meantime have been removed from the empty reel 62 and assembled with the full reel, or another available adapter unit may have been assembled with the full reel while the contents of reel 62 was being payed-out in the device 10. The operator next manipulates the handle 144 of the valve 138 from the full-line position into the dotted-line position in Fig. 1 in order to compel the operating mechanism 14 to swing the stand 12 into its raised pay-out position. During this swing of the stand 12 into its pay-out position, the journal sections of the new reel will first become seated on the surfaces 59 and 64 of the reel bearings in the stand, as will be readily understood, whereupon the stand will raise the full reel from the floor.

The explained exchange of reels on the stand 12 is in nowise interfered with by the brake mechanism 18 because the companion element of the brake drum 96, being a brake shoe 158, is swung out of the way of the brake drum, in a manner explained hereinafter, when the stand is lowered into its reel-exchange position. The decoder 16 is freely rotatable on a lateral stud 160 on a bracket 162 which is suitably swivelled at 164 on a top connecting bar 166 between opposite arms 168 that are suitably secured at their lower ends to a transverse bar 170 which is journaled within its ends on studs 172 on the opposite bottom rails 26 of the base frame 24 (Fig. 2). The bar 170, arms 168 and connecting bar 166 constitute a swinging frame 174 for the dancer roll 16, permitting bodily motion of the latter, in this instance in an arcuate path.

As best shown in Fig. 1, wire w or like flexible continuous stock to be payed-out from the supported reel 62 on the stand 12 is guided over the dancer roll 16 and is drawn therefrom, in the direction of the arrow 176 in Fig. 1, by any suitable means (not shown), such as a power-driven capstan, for instance. The wire w may thus be payed-out from the reel 62 for different purposes, such as passing the wire through an extruder to apply an insulating rubber coating thereon and subsequently passing the rubber-coated wire through a vulcanizer for curing the rubber coating on the wire, for instance. For this and other purposes it is of the essence that the payed-out wire is drawn at uniform speed, and to this end the brake action of the mechanism 18 on the turning reel 62 is made as nearly as possible responsive to inevitable variations in the tension of the drawn wire. Thus, it stands to reason that a full reel offers less resistance to the draw of wire therefrom at a certain uniform rate to that of a partially empty reel, with the result that the tension in the wire being drawn off will generally increase as the wire supply on the reel becomes gradually less. Also, uncontrollable inertia forces and variations in the frictional opposition to rotation of the reel, as well as frequent unevenness of successive wire layers on the reel, are responsible for more or less frequent variations in the tension of the drawn wire. These and other disturbing factors that make for unavoidable variations of the tension in the wire being drawn off are even aggravated at modern high pay-out
rates of wire from reels, so much so that the tension in the wire occasionally becomes excessive and causes the latter to snap apart unless the control over the tension in the wire being drawn off by proper brake action on the turning reel is not only sensitive, but also highly responsive, to variations in the wire tension. In order to achieve accurate control over the tension in the wire being drawn off by proper brake action on the turning reel, the brake mechanism 18 is operatively connected with the dancer roll 16 so that the former responds to the brake action on the reel 62 to bodily motion of the dancer roll. To this end, the aforementioned brake shoe 158, which is in the present instance is pivotally mounted at 180 on the stand arm 44 so as to be swingable into and from braking engagement with the periphery of the brake drum 96 on the reel in the stand, is connected with the dancer roll 16 by the operating linkage 20. This linkage 20 includes a link 182 having one end pivotally connected at 184 with the brake shoe 158 remote from its pivot mount 180 on the stand 12 (Fig. 1), and having its other end pivotally connected at 186 to one end of an arm 188 which is pivotally mounted in its ends, as at 190, on a bracket 192 on the aforementioned crossrig 42 between the side panels 36 and 38 of the base frame 24. The arm 188 is near its lower end connected by a link 194 with one of the arms 168 of the swinging roll frame 174. The dancer roll 16 and operating linkage 20 are normally urged into their respective full-line positions in Fig. 1 in which the operating linkage, under the urging of the main spring 22, reacts with the brake shoe 158 in causing the same to apply a maximum brake force to the drum 96 on the reel 62 in the stand 12. To this end, the aforementioned relatively powerful main spring 22, presently a tension spring, is anchored with one end, as at 198, to the lower end of the arm 188, while the other end of this spring is anchored at 200 to a bar 202 which, for variation of the tension of the main spring 22, is longitudinally adjustable in a bracket 204 on the rear crossrig 28 of the base frame 24 (Fig. 2), and is locked in adjusted position therein by a set screw 206 on the like. It thus follows from Figs. 1 and 2 that at least in the pay-out position of the stand 12 the main spring 22 will, through intermediation of the operating linkage 20, force the brake shoe 158 with a maximum braking force against the drum 96 on the reel 62 in the stand, and also urge the dancer roll 16 into the full-line position in Fig. 1 which may be termed its "optimum brake position."

Reference is now had to Figs. 4 and 5 which show the aforementioned lost-motion link 182 in detail. Thus, this link comprises complementary elements 208 and 210 of which the latter is tubular and the former is a bar slidably received in the tubular element 210. The bar 208 has the aforementioned pivot connection 184 with the brake shoe 158. The tubular element 210 has a closed end 212 in which is received the threaded shank 214 of a clevis 216 which has the aforementioned pivot connection 186 with the arm 188. Received in the tubular element 210 and interposed between its closed end 212 and the bar 208 therein is a compression-type spring 218 which in its relaxed condition holds the elements 208 and 210 apart to the extent indicated in Fig. 4. The spring 218 is adapted resiliently to oppose the take-up of the lost motion in the link 182. The range of the permissible lost motion in the link 182 is determined by the threaded shank 214 in the link element 210 and by an opposed stop member 220 in the link element 208. The shank 214 is presently in the form of a set screw threadedly received in the link element 208, whereas the range of the permissible lost motion in the link 182 is adjustable on adjustment of the stop member 220 in the link element 208. Desired adjustment of the stop member 220 in the link element 208 may be undertaken on temporarily removing the threaded shank 214 from the tubular member 210 and passing a screw driver
maximum value attainable solely by virtue of the gradual compression of the spring 218. However, when the dancer roll 16 reaches its full-line optimum brake position, this maximum brake force by the shoe 158 on the drum 96 will suddenly be greatly increased to that caused by the main spring 22 which then will directly react with the brake shoe on the take-up of the lost motion in the link 182 (Fig. 5).

The lost-motion range of the link 182 is preferably such that the full take-up of the lost motion by the dancer roll 16 requires bodily motion of the latter through a quite substantial range, i.e., from its dot-and-dash-line position into its full-line position in Fig. 1, in the present instance. Furthermore, the compression spring 218 in the link 182, while already described as being considerably weaker than the main spring 22, is preferably further selected so that its reactive force on the brake shoe varies to bring about such brake action on the supported reel in the stand which will keep the wire being drawn off most nearly under substantially constant tension regardless of the positions to which the roll 16 may dance within its operating range during the pay-out of the wire from the reel.

In thus arranging for a considerable bodily-motion range of the dancer roll 16, and providing in the lost-motion link 182 a compression spring 218 of such characteristics that its reaction with the brake shoe is as nearly as possible responsive to variations of the tension in the wire being drawn off, the dancer roll will not readily be caused to hunt or surge on even sudden and abnormal changes in the tension of the wire during its draw from the reel but will more gradually respond in its bodily motion to variations on the wire tension, and the brake action on the reel will be highly sensitive as well as responsive to variations in the wire tension, so much so that under normal wire pay-out conditions the tension in the wire will fluctuate relatively little and hardly ever give rise to a break in the wire being drawn off.

Assuming that the power-draw of the wire from the supported reel 26 in Fig. 1 is just being started, the tension in the wire being drawn off will increase until the pull thereon will overcome the inertia of the full reel and set the latter in rotary motion. Thus, it is at the very start of the pay-out operation that the power-draw of the wire encounters the maximum load or resistance, wherefore the dancer roll 16 may initially well be urged by the wire being drawn substantially to, or even into, the dot-and-dash-line position in Fig. 1 before the brake force on the reel is sufficient small to permit a start of the latter. Once the reel is in rotary motion and less tension in the wire is required to keep it in motion, the dancer roll 16 will back-up from its initial advanced starting position sufficiently to effect a brake action on the reel that will maintain the wire tension substantially at a predetermined constant value which is somewhat lower than the initial momentary tension in the wire at its start into motion. The wire tension is maintained substantially at this constant value throughout the pay-out of the wire from the reel, i.e., despite the gradually decreasing unwind diameter of the wire on the reel. This is due to the fact that the dancer roll will yield toward its dot-and-dash-line position in Fig. 1 as the tension in the wire being drawn off tends to increase with the decreasing unwind diameter of the wire on the reel, with the result that the brake action on the latter gradually decreases such that the tension in the wire remains substantially constant.

While the dancer roll 16 will during the pay-out of the wire from the reel 62 generally crest gradually toward its dot-and-dash-line position in Fig. 1 for the reason just mentioned, unavoidable variations in the wire tension from any of several possible causes may and will set the roll 12 into dancing back and forth, but within such a narrow range that the responsive brake action on the reel will hardly ever set the dancer roll into appreciable hunting or surging.

The moment the reel 62 is empty, the wire being drawn over the dancer roll 16 is without any appreciable tension, whereupon the powerful main spring 22 will almost simultaneously take up whatever lost motion is left in the link 182 and react with the brake shoe 158 in causing the latter to apply a maximum brake force to the drum 96 on the reel 62 which will assuredly stop continued rotation of the latter immediately.

While the described interposition of the compression spring 218 in the operating linkage 20 between the dancer roll 16 and brake shoe 158 is highly advantageous in that it brings about substantially surgeless response of the brake mechanism 18 to variations in the wire tension during normal pay-out of the wire from the reel, the provision in the link 182 for lost motion within a definite range between the link elements 208 and 210 is equally advantageous because it permits the powerful main spring 22 to come into play, immediately on a possible break in the wire being drawn from the reel, to take up the lost motion in the link 182 almost instantaneously and react with the brake shoe 158 in compelling the latter to apply a maximum brake force to the drum 96 on the spinning reel which is assuredly adequate to stop the latter before the same has the opportunity to whip the broken wire end around in a hazardous fashion or permit the wire on the reel to become appreciably raveled.

When the contents of the reel 62 on the stand 12 has been payed out, the linkages 20 and dancer roll 16 are immediately returned by the main spring 22 into their respective full-line positions in Fig. 1, as explained. The operator will next manipulate the handle 144 on the valve 138 in order to cause the operating mechanism 14 to swing the stand 12 from its pay-out position (Fig. 1) into the dot-and-dash-line position in Fig. 6 in order to exchange reels in the heretofore described manner. During an initial part of the downward swing of the stand 12 from its pay-out position the brake shoe 158 will remain in engagement with the periphery of the drum 96 until the compression spring 218 in the lost-motion link 182 has expanded to its substantially relaxed condition shown in Fig. 4. Thereafter and during the remaining downward swing of the stand 12, the linkage 20, by virtue of the exemplary spring connection 230 between its lost-motion link 182 and the brake shoe 158 will compel the latter to swing away from the drum 96, first into the full-line position and then into the dot-and-dash-line position in Fig. 6, so that the brake shoe will be out of the path of the drum 96 on removal of the empty reel 62 from the stand 12 and will also be out of the way of a drum on the next full reel being placed on the stand, as will be readily understood. As soon as the next full reel is placed on the stand 12 in its dot-and-dash-line reel-exchange position in Fig. 6, the operator manipulates the handle 144 of the valve 138 to cause the operating mechanism 14 to swing the stand into its pay-out position in the course of which the brake shoe will automatically reapproach the drum on the new reel and engage with the same with a maximum brake force by the time the stand reaches its pay-out position (Fig. 1).

Fig. 7 shows a modified lost-motion link 182' in the operating linkage 20' between the dancer roll 158' (not shown) the brake shoe 208' and the link elements 208' and 210' have a lost-motion connection of definite range, provided by a cross pin 232 in the link element 208' and a longitudinal slot or slots 234 in the link element 210' in which the pin 232 is received. The compression spring 218' in the modified link 182' is furthermore, pre-compressible to any desired extent by means of a shank shank 236 on the threaded stem 238 of a clevis 240 by means of which the link 182' is operatively connected by a readily removable pivot 242 with the arm 189'. On temporary removal of the pivot 242 and on raising the adjacent end of the link 182'
above the arm 188', the stem 238 of the clevis 240 may be turned in the adjacent threaded end 244 of the link element 210' for longitudinal adjustment of the shank 236 in order to vary the pre-compression of the spring 218', or for that matter to relieve it of any pre-compression whatsoever. A nut 246 may serve to lock the stem 238 of the clevis 240 in the threaded end 244 of the link element 210' in any adjusted position of the shank 236. Thus, the modified link 182' permits not only pre-compression of the spring 218' therein, but permits also variation of the length of the lost-motion range of the link elements 208' and 210' as well as a shift of this lost-motion range relative to the spring 218', by appropriate adjustment of the shank 236 or of the stop element 220', or both, longitudinally of the link 182'.

The invention may be carried out in other specific ways than those herein set forth without departing from the spirit and essential characteristics of the invention, and the present embodiments are, therefore, to be considered in all respects as illustrative and not restrictive, and all changes coming within the meaning and equivalency range of the appended claims are intended to be embraced therein.

I claim:
1. In a device for paying-out the contents of a reel carrying a brake drum, the combination of a bodily movable dancer roll unit; a stand having means for removably rotatably supporting a reel and being movable into raised pay-out and lowered real-exchange positions; means for moving said roll; a brake shoe pivoted on said stand for swinging movement into and from engagement with the drum on a supported reel; a linkage unit connecting said roll unit and shoe for swinging response of the latter to bodily movement of the former; spring means acting on one of said units normally to urge said roll unit into a first position in which said shoe engages and applies a maximum brake force to the drum when said stand is in its pay-out position, and to urge said roll unit beyond said first position to retain said shoe in engagement with the drum on movement of said stand from said pay-out position toward said real-exchange position and fixed means cooperating with one of said units to stop said roll unit at such a distance beyond said first position as to compel said shoe, after an initial part of the movement of said stand from its pay-out position, to swing away from the drum on continued movement of said stand into its real-exchange position so as to be out of the path of the drums on reels being interchanged on said stand in its real-exchange position.

2. The combination in a pay-out device as set forth in claim 1, in which said stand is pivoted at the bottom so as to have swinging movement into said pay-out and real-exchange positions, and is provided at its top with said real-supporting means, and said shoe is so coordinated with said roll unit that the former is swung counter to and away from the latter on said continued movement of said stand into its real-exchange position.

3. In a device for paying-out the contents of a reel having axial journals with a brake drum on one journal, the combination of a bodily movable dancer roll unit; a stand pivoted at the bottom and forward at the top with partial bearings open for lateral passage thereinto and removal therefrom of the journals of a reel; means for swinging said stand into pay-out and real-exchange positions in which said bearings are raised and lowered for rotatably supporting a reel on its journals therein and for exchanging therein the journals of reels on rolling the latter on the floor, respectively; a brake shoe pivoted on said stand for swinging movement into and from engagement with the drum on a supported reel; a linkage unit connecting said roll unit and shoe for swinging response of the latter to bodily movement of the former; spring means acting on one of said units normally to urge said roll unit into a first position in which said shoe engages and applies a maximum brake force to the drum when said stand is in its pay-out position, and to urge said roll unit beyond said first position to retain said shoe in engagement with the drum on movement of said stand from said pay-out position toward said real-exchange position; and fixed means cooperating with one of said units to stop said roll unit at such a distance beyond said first position as to compel said shoe, after an initial part of the swing of said stand from its pay-out position, to swing away from the drum on continued swing of said stand into its real-exchange position so as to be out of the path of the drums on reels being interchanged on said stand in its real-exchange position.

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