Feb. 20, 1951 B. F. SHAFFER ET AL 2,542,097

CREEL TENSIONING DEVICE

Filed July 10, 1948 3 Sheets-Sheet 1

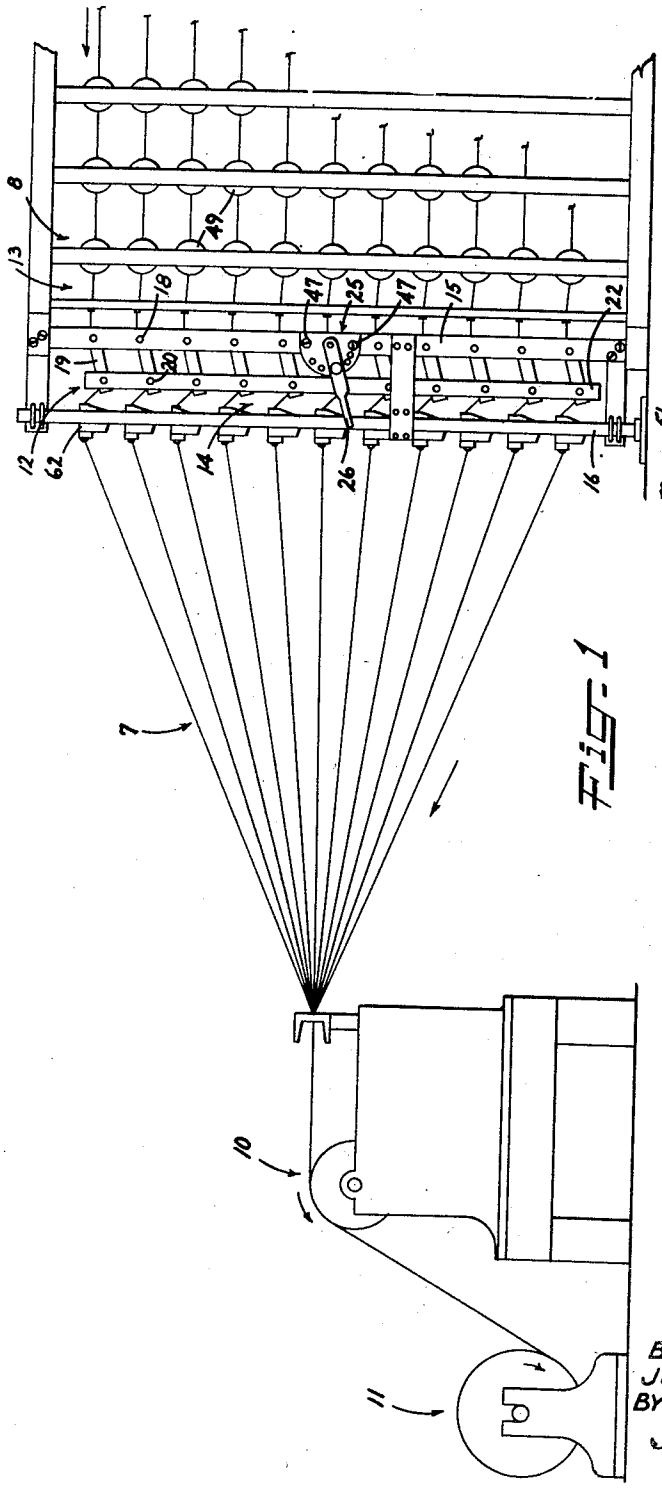


FIG. 1

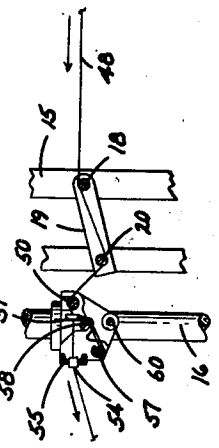


FIG. 3

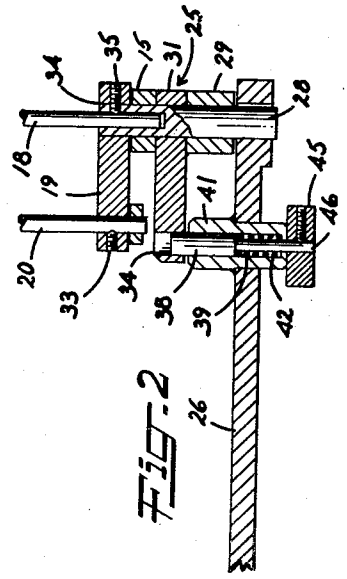


FIG. 2

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CREEL TENSIONING DEVICE

Filed July 10, 1948 3 Sheets-Sheet 2

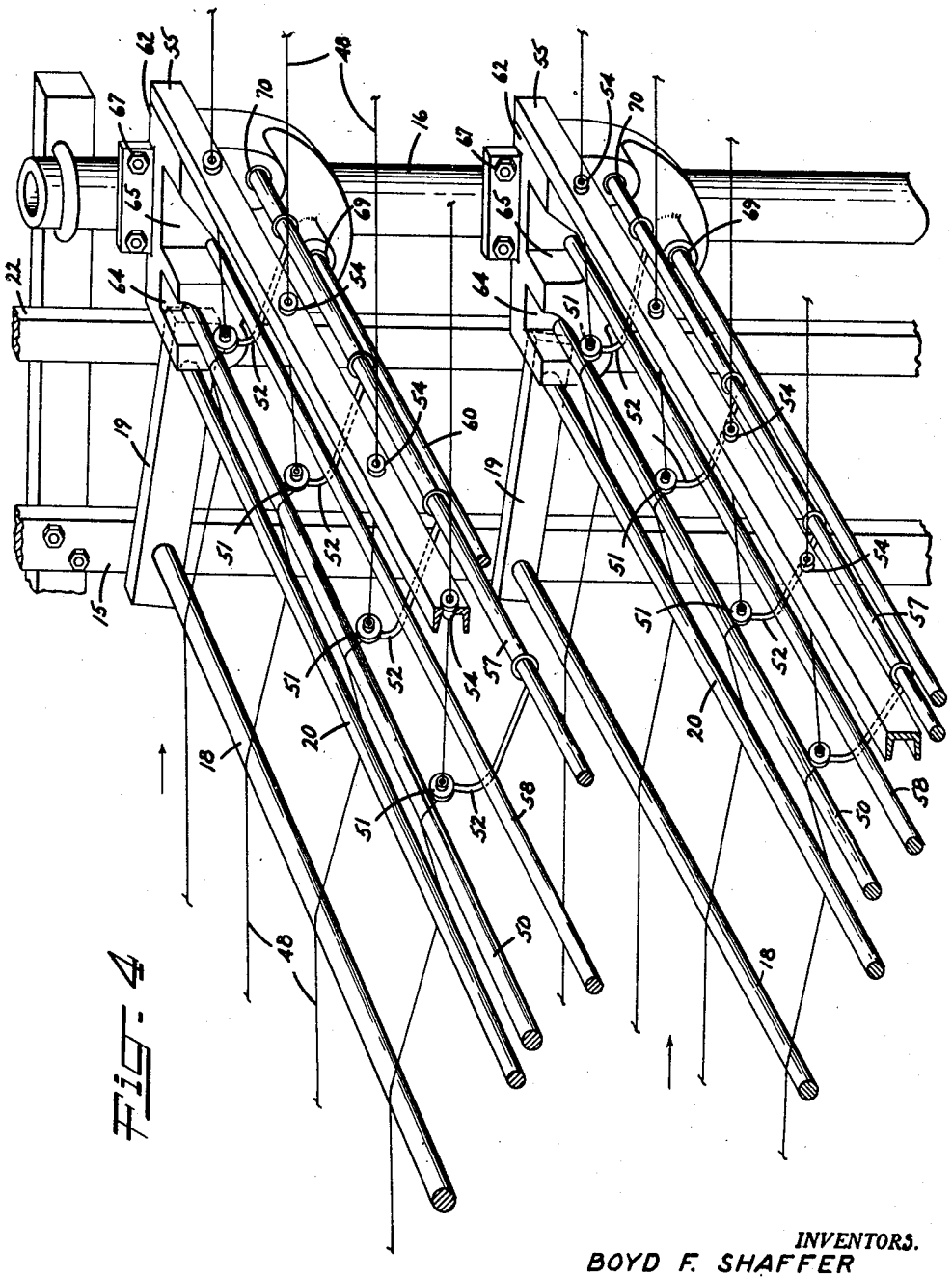


FIG. 4

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CREEL TENSIONING DEVICE

Filed July 10, 1948 3 Sheets-Sheet 3

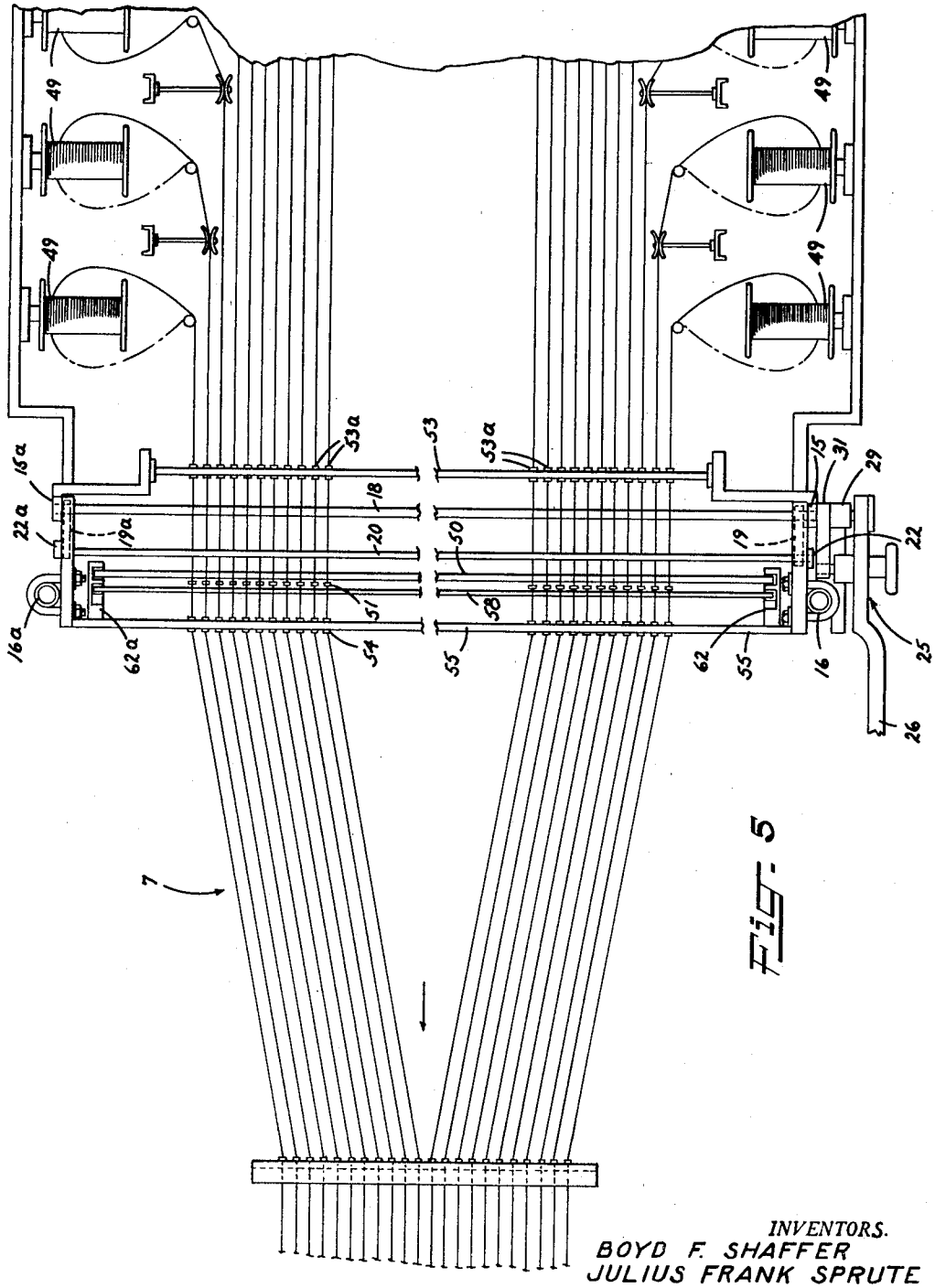


FIG. 5

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Patented Feb. 20, 1951

2,542,097

UNITED STATES PATENT OFFICE

2,542,097

CREEL TENSIONING DEVICE

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Application July 10, 1948, Serial No. 38,152

12 Claims. (Cl. 28—35)

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This invention relates to creels and particularly to a construction or device used in connection therewith for controlling the tension of strand being withdrawn from creel-supported strand packages.

In preparing beams of textile material for weaving purposes, many strands are removed simultaneously from many packages stored on a creel or other package storing device. The strands are ordinarily drawn through suitable strand-breakage detecting and tensioning devices as they pass to the beam. The tension is preferably closely regulated, as cloth produced from a warp or beam comprising strands which lack uniformity in tension will be rough in appearance and feel, and inferior in quality. Tension and thread breakage devices such as now used, are placed between the creel and the beam or adjacent to individual spools, cones or bobbins supported on the creel so that means for controlling the operation of the beaming machine will be responsive to breakage of any one of the strands. However, in obtaining this end, the present creels have been made unduly mechanically complex and repetitious in parts of similar function.

It is an object of the invention to provide a simple auxiliary strand tensioning apparatus for installation as a portion of a creel or as a separate unit between the creel and a beamer. It is also an object to provide a strand tensioning device having its structure integral with that of thread-breakage detection apparatus. It is a further object of the invention to eliminate much of the duplication of parts found in conventional devices for controlling the tension of yarn being withdrawn from a creel or for detecting broken yarn. Still another object is to provide apparatus which produces tension simultaneously in all strands leaving the creel and which instantly stops the beaming machine when one of the strands break. Other objects, features and advantages will be apparent from the following description of the invention and the invention and the drawings illustrative thereof in which:

Fig. 1 is an elevation view of a tension device according to the invention in conjunction with a beaming machine and a creel only partly shown;

Fig. 2 is a section view of a lever means used for adjusting the tension bars;

Fig. 3 is a fragmentary cutaway view of apparatus illustrated in Fig. 1;

Fig. 4 is a perspective view of a portion of the tensioning and thread breakage detection apparatus illustrated in Fig. 1; and

Fig. 5 is a plan view of the apparatus of the invention showing partially the apparatus shown in Fig. 1.

Briefly, the invention comprises apparatus which may be a part of a creel or a separate unit supported between a creel and a beaming

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machine, adapted for tensioning each strand led from the creel and for detecting breakage of any such strand, and if breakage does occur, for stopping the machine.

Fig. 1 illustrates a plurality of strands 7 being drawn from a creel 8 through a beaming machine and onto a takeup roll or beam 11. The apparatus of the invention is shown in this view attached to the section of, or constituting a part of, the creel facing the beaming machine. This apparatus consists of an assembly 14 which comprises all parts which derive their support from vertical members 15 and 16. There are similar members 15*a* and 16*a* at the opposite side of similar construction and function. Extending between the supporting members 15, 16 and members 15*a*, 16*a* respectively, are numerous parallel rods hereinafter described which guide the thread through a sinuous tension producing path. One series of such vertically spaced horizontally extending rods are the spaced rods 18, which extend between members 15 and 15*a*. Another series of vertically spaced horizontal rods 20 extend transversely of the creel and parallel to the rods 18 between a pair of vertical members 22 and 22*a*; the rods 20 and 18 are similarly spaced in a vertical direction. Each rod 18 is connected to a rod 20 by a pair of short link members 19. The links 19 are apertured near each end for extension therethrough of the rods 18 and 20. They may be spaced as shown in the drawings for extending between the end portions of the rods 18 and 20. The links 19 may be secured on the rods 18 and 20, by means such as the set screws 33 and 35 of Fig. 2, in which case the rods 18 and 20 are permited rotational freedom in the apertures therefor through the upright members 15 and 22. Alternatively, the links need not be keyed or secured to the rods 18 and 20 but allowed rotational freedom with respect thereto if the rods 18 and 20 are secured to the members 15 and 15*a*, and 22 and 22*a* respectively. The former arrangement is preferred however because of the greater stability imparted to the assembly.

In the completed assembly, a movable frame 12 comprising upright members 22 and 22*a* and the parallel rods 20 extending therebetween may be raised and lowered with respect to a stationary frame 13 comprising upright members 15 and 15*a* and the rods 18. However, vertical adjustment of the movable frame 12 is brought about by movement thereof along a path limited by the arcs described by the link members 19 as they pivot about the axis of the rods 18 to which they are attached. When the links 19 are in a horizontal position the frames are farthest apart; if the movable frame 12 is higher or lower than this position, then the movable frame will be closer to the stationary frame 15. In the embodiment shown it is preferable to adjust the movable frame downward from the position

wherein the links 19 are horizontal to obtain variation in the tension of the thread or strand passing through the apparatus.

Raising or lowering of the movable frame 12 is effected by means of an adjustable lever assembly 25 which comprises a handle 26 fixed on the shaft 28 extending through a spacer washer 29, an aperture plate 31, upright member 15 and a suitable aperture 34 therefore in the link 19. The shaft 28 may be rotatable with respect to all the members through which it extends except the link 19 and the handle 28. The shaft 28 is suitably recessed or bored from the end extending through link 19 to receive the rod 18. The link 19 is secured non-rotatably upon the shaft 28 by such a means as the set screw 35 which extends inwardly against the rod 18 thus fixing the position of the shaft 28 and the handle with respect to the other members of the assembly laterally as well as angularly. The aperture plate 31, of approximate semi-circular shape in the embodiment shown, is apertured along the arc of a radius measured from the axis of the shaft 28 in a desired pattern of apertures each of which is adapted to receive a slideable pin 38 which extends laterally from the handle 26. The handle 26 is secured in various positions about the axis of shaft 28 by the pin 38, slideable along a bore 39 provided in the sleeve 41, extending laterally through an aperture 34 therefor in the plate 31. A spiral spring 42 housed along the bore 39 urges the pin 38 against the aperture plate 31 or into one of the apertures 34. An annular finger grip 45 connected with the pin 38 by a small shaft 46 is provided for withdrawing the pin 38 from one of the apertures 34 during readjustment of the tensioning apparatus. The aperture plate 31 may be secured to a stationary member of the apparatus or creel frame such as shown in Fig. 1 wherein the plate 31 is secured to the member 15 by screws 47.

Fig. 3 illustrates the path of the thread 48 as it passes through and around the various members which constitute the tensioning and thread breakage detection apparatus. Thread traveling in the direction indicated in Fig. 3 as it comes from a thread package 49 supported within the structure of the creel 8 passes through an eye bar 53 provided with eyes 53*a* which space a plurality of threads for passage through the tensioning and thread-breakage detection apparatus. The thread 48 then passes over the bar 18 and under the bar 20, over a bar 50, and through the eye of a drop wire 52, stationarily positioned through a rigid cross member 55. The drop wire 52 is pivoted on a bar 57. When thread is passing through the eye 51, the drop wire is held by the thread in an upward position against the bar 58. The thread normally makes a slight dip in passing through the eye 51 as it traverses the portion of its path between bar 50 and eye 54. When the thread breaks, the drop wire pivots freely upon the bar 57, and the swinging end thereof drops down against the bar 60 thereby closing an electrical circuit of which the bars 57 and 60 are terminals. A beamer control mechanism (not shown) is energized by the closed circuit and is caused to stop a thread withdrawal means such as the beamer 10. Fig. 3 illustrates a position of the machine with but one thread path showing; Fig. 4 shows but a fragmentary portion of the apparatus but illustrates how many threads may pass through a single unit according to the invention.

Rods 50, 57, 58 and 60 all extend between brackets disposed as opposite sides of the creel such as the brackets 62 and 62*a*. These brackets are all similarly constructed except that they must be varied in their construction to adapt them to opposite sides. For example, the brackets on opposite ends of the same set of rods will be mirror images of each other. Rods 57 and 60 act as terminals for an electrical circuit which is completed when one of the drop wires 52 pivoted on the rod 57 drops across the rod 60. These rods may be secured within the brackets as shown but they are prevented from making electrical contact with the brackets 62 or any portion of the apparatus or creel frame by insulating them by a means such as the non-conductive sleeves or bushings 69 and 70.

Channel bars 55 provided with thread eyes 54 are fixed to and extend between right and left brackets 62 and 62*a*. Bars 55 also space the opposite brackets and serve as stabilizing and reenforcing members for the apparatus. Rods 50 and 58 are readily removable from the brackets 62 and are supported in recesses 64 and 65, respectively of the brackets. The rod 58 is provided for limiting the upward movement of the drop wires 52 and for holding them steady during passage of the thread through the apparatus. The rod 50 is positioned at a slightly higher level than the eyes 51 of the drop wires 52. A friction surface is thereby produced on the rod 50 over which the yarn must pass. The degree or amount of contact of the thread with the rod 50 varies according to the amount of change of direction in the path of the thread around the rod 50 caused by the relative positions of rod 20 and the eye 51 of the dropwire. Such a change will be produced primarily raising or lowering of the frame 12 to which the rod 20 is attached. Lowering of the frame 12 will increase the amount of contact of the thread 48 with the rods 18 and 20 as well as with the rod 50 and result in a substantial increase in tension in the thread between the creel 8 and the beamer 10.

By this invention, an apparatus has been constructed wherein a great number of ends of thread, yarn, cord and the like may be drawn through a single apparatus which uniformly tensions all the ends but is responsive to the breaking of a single end whereby the beaming or other textile processing operation may be immediately stopped. It has been possible by constructing a single apparatus with interdependent parts which cooperate to tension the strand and to detect broken yarn strands, to eliminate a great percentage of the multiplicity of parts needed to carry out the operations by separate apparatus for each function. Moreover an apparatus has been produced which may be constructed as an independent unit and placed on transportable means such as casters and moved from creel to creel, or built into the creel structure itself.

While a preferred embodiment of the invention has been shown, it is to be understood that changes and variations may be made without departing from the spirit and scope of the invention as defined by the appended claims.

We claim:

1. A yarn tensioning and breakage detection device for a creel adapted to be placed between the package supporting section of a creel and a yarn withdrawing means comprising a series of three laterally spaced horizontal rods, connecting means extending between the middle rod and one of the other rods pivotable with respect to the other rod, means for adjusting the middle rod

along the arc through which it swings when the connecting means is pivoted, and means for thread breakage detection.

2. A yarn tensioning and breakage detection device as in claim 1 wherein the thread breakage detection means comprises a plurality electrically conductive elements positioned in parallel arrangement in a direction parallel to and laterally spaced from one of the outside rods, one end of each of the elements apertured to receive a yarn strand and the other end pivotably attached to an electrically conductive supporting means, and electrically conductive catching means against which the swingable apertured ends of the elements may fall when unsupported by a strand.

3. A strand tensioning and breakage detection device comprising in the order occurring along the strand path an upwardly facing rounded surface transversely arranged with respect to the path of the strand, a downwardly facing rounded surface parallel to, laterally spaced from, and swingable in a circular path about the upwardly facing surface, a second upwardly facing rounded surface parallel to and laterally spaced from the first two surfaces and lying above a plane passing through said surfaces, an electrical terminal, an electrical conducting element pivotable at one end upon the terminal having a thread conducting aperture at the other end lower than a plane containing the downwardly facing surface and the second upwardly facing surface, a member lying within a region traversible by the swingable end of the element but above the element whereby the upward movement of the element is limited, another terminal lying within the region traversible by the swingable end of the element spaced below the normal thread-carrying position of the element, and a stationarily supported eye spaced from the thread-carrying aperture of the element and lying in a plane above that occupied by said aperture and the second upwardly facing surface.

4. A yarn tensioning device for a creel comprising side support members, a first set of parallel bars spaced in a direction parallel to the members extending between and attached to the members, a frame comprising side portions and a second set of bars parallel to and having the same spacing as the first set extending between and fixed to the side portions, short link members of equal length pivotably attached by ends thereof to the first set of bars and pivotably attached by their other ends in parallel arrangement to the bars of the frame, means for adjustably changing the position of the frame in a path limited by the pivoting of the link members about the first set of bars, a third set of bars parallel to but out of lateral alignment with the first and second sets of bars, and support means for the third set of bars.

5. A yarn tensioning and breakage detection device for a creel comprising in the order in which they occur along the yarn path, a horizontal bar having an upwardly facing thread supporting surface, a second bar parallel with the first having a downwardly facing thread supporting surface means for adjusting the second bar upwardly or downwardly, a third bar parallel with the first and second bars having an upwardly facing thread supporting surface, electrically conductive elements pivotable in planes normal to the bars each of which is pivotably supported by one end upon an electrically conductive bar parallel with the other bars and each element having an aperture at its other end for passage therethrough of yarn, another electrically conductive bar parallel with the other bars passing underneath the elements and spaced from the first electrically conductive bar to catch unsupported elements, and a bar parallel with the other bars passing above the swingable end portions of the elements for restricting upward movement of said end portions.

6. A yarn tensioning and breakage detection device for a creel comprising in the order in which they occur along the yarn path, side support members, a first set of parallel bars spaced from each other in a direction parallel to the members extending between and attached to the members, a frame comprsing side portions and a second set of bars parallel to and having the same spacing as the first set of bars extending between and fixed to the side portions, short link members of equal length pivotably attached by ends thereof to the first set of bars and pivotably attached by their other ends in parallel arrangement to the bars of the frame, means for changing the position of the frame along a path limited by the pivoting of the link members about the first set of bars, a third set of bars extending between the side support means parallel to but out of lateral alignment with the bars of first and second sets, a strand-breakage sensitive means, and means responsive to the strand-breakage sensitive means for stopping the movement of the strands.

7. A yarn tensioning and thread breakage device for a creel comprising side support members, and in the order in which they occur, a first set of vertically spaced parallel bars extending between the side support members said bars spaced to receive yarn from packages at various levels in the creel, a frame comprising side portions and a second set of bars parallel to and having the same spacing as the first set of bars extending between and attached to the side portions, short links pivotably attached by ends therefor to the frame and extending in parallel arrangement to a portion of the device comprising the first set of rods and support thereof to which the links are pivotably attached by their other ends, means for changing the position of the frame along a path limited by the pivoting of the link members about points of attachment with said portion of the device, and a third set of bars extending between the side support members parallel and spaced from the other sets of bars, each bar of the third set lying outside a plane passing through a bar of the first set and a bar of the second set spaced along a single yarn path, a set of electrically conductive rods parallel to the rods and fixed to the side support members but electrically insulated therefrom by non-conductive sleeves, a plurality of separate electrically conductive elements supported on each electrically conductive rod, each element supported by one end on said rod, and having an aperture at the other end for passage therethrough of a strand, a set of rods parallel to the other rods for limiting the upward movement of the swingable ends of the elements extending between the side support members transversely above the upper surface of the elements, a second set of electrically conductive rods parallel to the other rods extending between the support means but electrically insulated therefrom each of the second set of electrically conductive rods extending below and transversely of the elements supported by one of the first set of electrically conductive rods and spaced from the rods of the first set to receive

unsupported swingable end portions of the elements.

8. A yarn tension and thread breakage detection device as in claim 7 which comprises also an eye bar parallel with the other mentioned bars for spacing the yarn leaving the device.

9. A yarn tension and thread breakage device as in claim 7 wherein the bars of the third set and the electrically non-conductive bars are loosely supported on the side support members, said members being provided with slots opening upwardly so that the bars may be quickly removed from the device.

10. A yarn tensioning and breakage detection device for a creel comprising in the order in which they occur along the yarn path, side support members, a first set of parallel bars spaced from each other in a direction parallel to the members extending between and attached to the members, a frame comprising side portions and a second set of bars parallel to and having the same spacing as the first set of bars extending between and fixed to the side portions, short link members of equal length pivotably attached by ends thereof to the first set of bars and pivotably attached by their other ends in parallel arrangement to the bars of the frame, means for resetting the position of the frame along a path limited by the pivoting of the link members about the first set of bars, a third set of bars extending between the side support means parallel to and lying outside the plane containing the first and second sets of bars, a set of electrically conductive rods parallel to the other rods extending between the side support means, but electrically insulated therefrom, a plurality of separate electrical conductive elements and each electrically conductive rod pivotably supported by one end on the rod and having an aperture at the other end for passage of a strand therethrough, a set of bars for limiting the upward movement of the electrically conductive elements parallel to the other rods extending between the side support means transversely above the upper surfaces of the elements, and a second set of electrically conductive rods extending between the side support means below the swingable ends of the elements and spaced from the first electrically conductive rods to receive unsupported swingable end portions of the elements.

11. A yarn package creel comprising means for supporting a plurality of yarn packages, an end section through which yarn is drawn from the packages, and tensicning and yarn-breakage detecting means mounted within the end section comprising in the order in which they occur along a yarn path a first set of vertically spaced parallel bars extending between the sides of the end section said bars spaced to receive yarn from packages at various levels in the creels, a frame comprising side portions and a second set of bars parallel to and spaced the same as the first extending between and fixed to the side portions, short link members pivotably attached by ends thereof to the frame and extending in parallel arrangement to a portion of the creel structure comprising the first set of rods and support therefor to which the links are pivotably attached by their other ends, means for changing the position of the frame along a path limited by the pivoting of the link members about points of attachment with said portion of the creel structure, and a third set of bars spaced from the first and second sets of bars, extending between sides of the end section of the creel parallel to each bar of the third set lying above a plane passing through a bar of the first set and a bar of the second set spaced along a single yarn path, an electrically conductive set of rods parallel to the other rods and extending between and attached to the sides of the end section of the creel but electrically insulated therefrom, a plurality of separate electrically conductive elements supported on each of the electrically conductive rods each pivotably supported by one end on the rod and having an aperture at the other end for passage of a strand therethrough, a set of rods parallel to the other rods for limiting the upward movement of the electrical conductive elements extending between the sides of the creel transversely above the upper surfaces of the elements, a second set of electrically conductive rods extending between the support means transversely below the elements and spaced from the first set of electrically conductive rods to receive unsupported swingable end portions of the elements, and an eye bar extending between the support means for spacing the yarn leaving the creel.

12. A yarn package creel comprising means for supporting a plurality of yarn packages, an end section through which yarn is drawn from the packages, and tensioning means mounted within the end section parts of which are named in the order in which they occur along a yarn path comprising a first set of vertically spaced parallel bars extending between sides of the end section, said bars spaced to receive yarn from packages at various levels in the creel, a frame comprising side portions and a second set of bars parallel to and having the same spacing as the first set of bars extending between and attached to the side portions, short link members pivotably attached by ends thereof to the frame and extending in parallel arrangement to a portion of the creel structure including the first set of rods and support therefor to which the links are pivotably attached by their other ends, means for changing the position of the frame along a path limited by the pivoting of the link members about points of attachment with said portion of the creel structure, a third set of bars extending between sides of the end section of the creel parallel to and spaced from the other sets of bars, each bar of the third set lying outside a plane passing through a bar of the first set and a bar of the second set spaced along a single yarn path, a yarn-breakage detecting means, and means responsive to the detecting means for stopping a drawing means for the yarn.

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