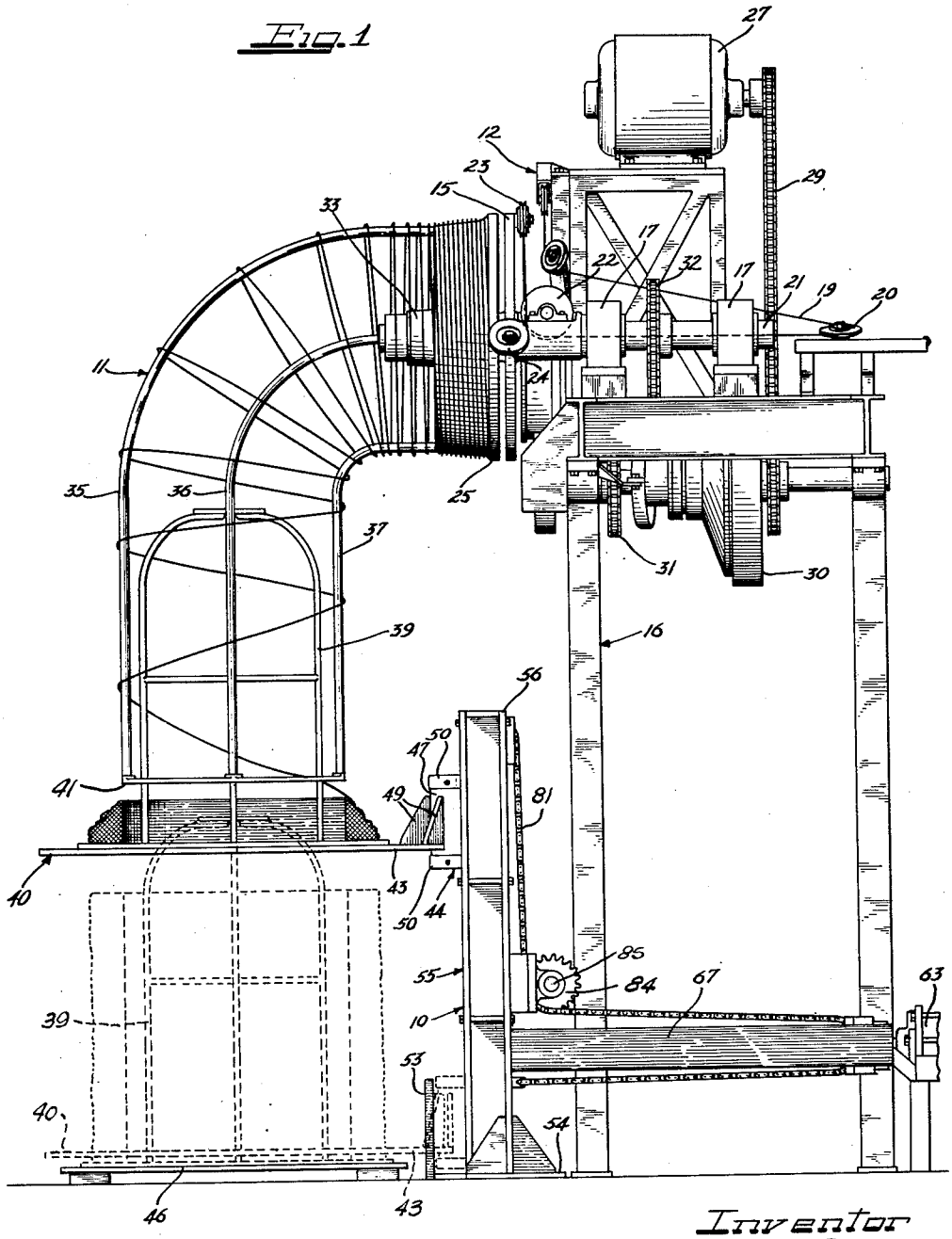
March 8, 1955 G. W. BELL 2,703,686

HYDRAULICALLY OPERATED LETDOWN AND RELEASE FOR WIRE LAYERS

Filed June 18, 1953 2 Sheets-Sheet 1

Fig. 1



Inventor
George W. Bell

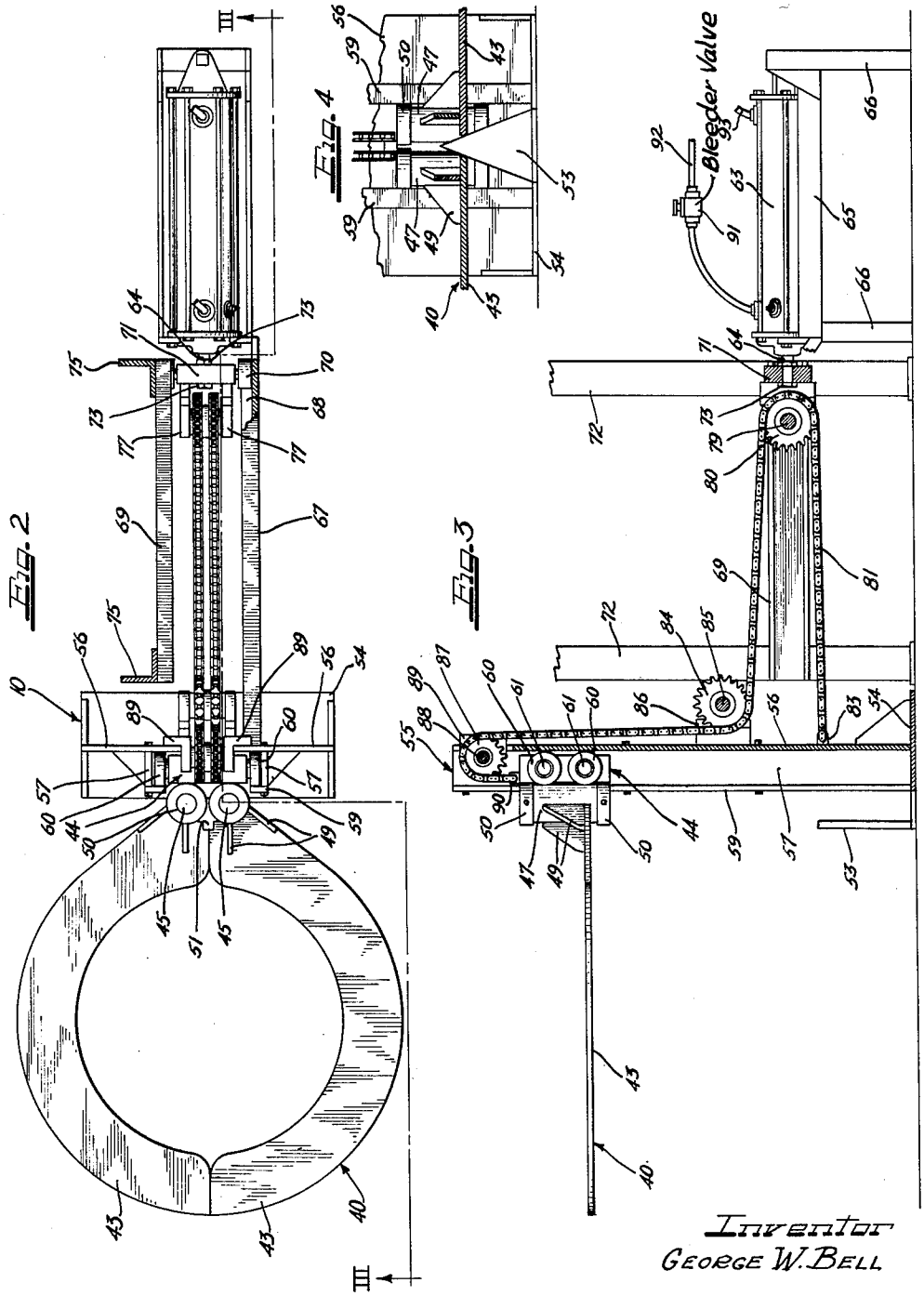
Kill, Sherman, Meroni, Gross & Simpson
Attys.

by

March 8, 1955 G. W. BELL 2,703,686

HYDRAULICALLY OPERATED LETDOWN AND RELEASE FOR WIRE LAYERS

Filed June 18, 1953 2 Sheets-Sheet 2



Inventor
George W. Bell

by Hill, Sherman, Meroni, Gross & Simpson Attys.

United States Patent Office

2,703,686

Patented Mar. 8, 1955

2,703,686

HYDRAULICALLY OPERATED LETDOWN AND RELEASE FOR WIRE LAYERS

George W. Bell, Sterling, Ill., assignor to Northwestern Steel and Wire Co., Sterling, Ill., a corporation of Illinois

Application June 18, 1953, Serial No. 362,599

11 Claims. (Cl. 242—82)

This invention relates to improvements in reel supports for the coiling of wire and more particularly relates to a hydraulically operated and controlled lift and tensioning let down, and coil release for wire layers which lay wire in the form of a coil.

A principal object of my invention is to provide a hydraulically controlled let down and release for wire layers, arranged with a view toward maintaining tension on the wire during coiling, and releasing the coiled wire at the end of the coiling operation.

Another object of my invention is to provide a simplified form of lift and support for association with a wire layer, supporting a reel at the discharge end of the wire layer, and letting the reel down as the wire is laid thereon at a rate sufficient to maintain tension on the wire during the coiling thereof.

Still another object of my invention is to provide a hydraulically controlled let down and release for wire layers supporting a reel in telescopic relation with respect to the discharge end of a wire layer and letting the reel down by gravity under hydraulic control, as the wire is coiled thereon, and releasing the reel and coiled wire thereon at the end of the coiling operation.

Still another object of my invention is to provide a simplified form of reel support for wire layers, automatically letting the reel down under hydraulic control in accordance with the wire laid thereon, and increasing the size of coil that can be laid, by extending the reel from the coil transfer frame of the wire layer, at the rate of coiling of the wire thereon, and maintaining the proper tension on the wire during the entire coiling operation.

Still another object of my invention is to provide a hydraulically controlled lift and let down and release for wire layers, wherein a platform comprising two semi-annular pivoted arms elevates an empty wire reel into telescopic relation with respect to the coil transferring means for the wire layer and lets the reel down during coiling of the wire thereon under hydraulic control, at a rate sufficient to prevent kinking or tangling of the wire during coiling, and wherein the coiled reel is released by spreading the arms by gravity by lowering movement thereof at the end of the lowering operation.

The wire layer with which the device of my present invention is associated embodies the principles of my Patent No. 2,629,564 which issued on February 24, 1953 and is entitled "Wire Laying Machine."

These and other objects of my invention will appear from time to time as the following specification proceeds and with reference to the accompanying drawings wherein:

Figure 1 is a view in side elevation of a wire layer having a lift and tensioning let down constructed in accordance with my invention associated therewith and showing the wire reel supported in an elevated position in telescopic relation with respect to the coil transferring means of the wire layer;

Figure 2 is a plan view of the hydraulic lift and tensioning let down shown in Figure 1, with certain parts of the frame and guide track for the lifting platform broken away and shown in horizontal section;

Figure 3 is a sectional view taken substantially along line III—III of Figure 2; and

Figure 4 is a fragmentary end view showing the spreading wedge in engagement with the support arms of the lifting platform, to move the same to a released position toward the end of downward travel of the platform.

In the embodiment of my invention illustrated in the drawings, I have shown a hydraulic lift and tensioning let down **10** in association with a transfer frame **11** of a wire laying machine **12**. The wire laying machine **12** is herein shown as being of a type clearly shown and described in my Patent No. 2,629,564 dated February 24, 1953 so only herein shown and described in sufficient detail to point out that the wire laying machine includes a winding member **15** journaled on a frame **16** in bearing supports **17, 17** for rotation about a horizontal axis extending transversely of the frame. A wire **19**, which may be trained from a wire drawing machine or an annealer or galvanizer is shown as being trained around a guide sheave **20** at the opposite side of the frame **16** from the winding member **15**, through the center of a support and drive shaft **21** for the winding member **15**. From the guide sheave **20** the wire is trained about a sheave **22** adjacent the winding member **15**, radially outwardly from the center of the shaft **21** around a sheave **23** adjacent the periphery of the winding member **15**. From thence the wire **19** is trained about a direction changing sheave **24** across the periphery of the winding member **15** onto a coiling block **25**. The shaft **21** and winding member **15** are shown as being driven in a direction to lay wire on the coiling block **25** by means of a motor **27**, a chain and sprocket drive **29**, a clutch **30**, and chain and sprocket drives **31** and **32**, as in my aforementioned Patent No. 2,629,564, so not herein shown or described further.

The coiling block **25** is shown as being of a drum-like construction having a hub **33** freely journaled on the projecting end of the shaft **21** and held from rotation with said shaft by the overhanging weight of the depending coil transfer frame **11**.

The coil transfer frame **11** is shown as being an open frame formed from a plurality of spaced stakes **35, 36, 36** and **37** secured to and extending outwardly from the coiling block **25** and curving downwardly therefrom toward the ground, to provide a guide for the wire laid thereon arranged to discharge the wire from the end of said frame onto a reel **39**. The reel **39** is shown in Figure 1 as being supported in an elevated position, on a platform **40** of the lift and tensioning let down **10** and extending within the stakes **35, 36, 36** and **37** and an annular ring **41** secured to the bottoms of said stakes. The coil transfer frame **11** comprising the stakes **35, 36, 36** and **37** and ring **41**, as in my Patent No. 2,629,564 forms a downwardly curving continuation of the coiling block **25**, for guiding the wire to be laid onto the reel **39** by gravity as it is laid on the coiling block **25** by the rotating winding member **15**.

Referring now to the platform **40** and the vertically movable support for the reel **39** and the coiled wire laid thereon by the coil transferring frame **11**, the platform **40** is shown as comprising two vertically pivoted semi-annular arms **43, 43** in the general form of an annulus when closed. The arms **43, 43** are pivotally supported at their inner ends on a carriage **44** for movement about two closely spaced vertical shafts **45, 45**, carried by said carriage at the forward end thereof (Figure 2).

As herein shown, each arm **43** has a vertical collar **47** at the inner end thereof through which the shaft **45** extends. Gusset plates **49, 49** are provided to brace said arms to said collars and take the overhanging weight thereof. The shaft **45** is mounted at its ends in two vertically spaced collars **50, 50** extending forwardly from the carriage **44** and suitably secured thereto.

The arms **43, 43** also have facing recesses **51, 51** formed therein adjacent the collars **47, 47**. The recesses **51, 51** are adapted to be engaged by a spreader wedge or camming member **53**, herein shown as being mounted on a base plate **54** for a vertically extending guide track **55** for the carriage **44**. The spreader wedge **53** is herein shown as being of a generally triangular form with its apex facing the recesses **51, 51** and positioned to come into engagement with said recesses and pivot the arms **43, 43** outwardly, as said arms move downwardly into engagement with and along opposite sides of said wedge, by the weight of the coiled wire laid thereon.

The guide track **55** is herein shown as being formed from two laterally spaced transverse vertically extend-

ing plates **56, 56** mounted on the base plate **54** and extending upwardly therefrom. Secured to each plate **56** and extending perpendicular thereto and forwardly therefrom is an end plate **57** having a gib **59** secured to the end thereof and extending inwardly from the forward end thereof. The spaces between the gibs **59, 59** and the plates **56, 56** form vertical channel-like guide tracks for two spaced rollers **60, 60** mounted on each side of the carriage **44**. The rollers **60, 60** are shown as being mounted on said carriage in vertically spaced relation with respect to each other on transverse shafts **61, 61**.

The means for vertically moving the carriage **44** along the guide track **55** is shown as comprising a horizontally extending fluid pressure cylinder **63** having a piston (not shown) therein with a piston rod **64** extensible therefrom. The cylinder **63** is shown as being mounted in a cradle **65**, supported on legs **66, 66** and spaced from the guide track **55** and held in position with respect thereto by a horizontally extending guide track **67**. The guide track **67** is connected between forward end of the cradle **65** and a vertical plate **56** of the guide track **55**. It is of course obvious that the cradle **65** may be anchored to the foundation for the wire layer. The horizontally extending guide track **67** is shown as having an inwardly facing channeled guide **68** facing a channeled guide **69**, within which are guided rollers **70, 70** on a carriage **71**, secured to the outer end of the piston rod **64**. The channeled guide **69** is shown as being mounted between legs **72, 72** of the frame **16**, and may be suitably secured thereto, as by welding.

The carriage **71** is shown as being secured to the piston rod **64** as by nuts **73, 73**, threaded on said piston rod and engaging opposite sides of said carriage. The carriage **71** is also shown as having two forwardly extending parallel arms **77, 77** within which is journaled a shaft **79** having two spaced sprockets **80, 80** mounted thereon between said arms. The sprockets **80, 80** are herein shown as forming direction changing devices and reaction members for draft devices **81, 81**, herein shown as being drive chains of a well known form. The draft devices **81, 81** are shown as being connected to the plates **56, 56** at one of their ends by means of connectors **83** facing the carriage **71**. From thence the draft devices **81** extend toward the carriage **71** and are trained about the sprockets **80, 80**. The flexible draft devices **81, 81** then extend forwardly therefrom, and are trained about two spaced sprockets **84, 84** on a transverse shaft **85**. The shaft **85** is mounted in spaced brackets **86, 86** secured to and extending rearwardly from the plates **56, 56** toward the carriage **71**. From thence the flexible draft devices extend upwardly and are trained about direction changing sprockets **87, 87** on a transverse shaft **88** at the upper end of the vertical guide track **55**. The transverse shaft **88** is shown as being mounted at its ends two support members **89, 89**, mounted at the inner ends of the plates **56, 56** and extending inwardly therefrom over the carriage **44**. The free ends of the flexible draft devices **81, 81** are shown as being secured to connectors **90, 90** extending upwardly from the carriage **44**. It is obvious from the foregoing that upon extensible movement of the piston rod **64** from the cylinder **63** the carriage **44** and platform **40** will be lowered and upon retraction of said piston rod within the cylinder **63** as by the admission of fluid under pressure to the piston rod end of said cylinder the carriage **44** and platform **40** will be raised to the elevated position shown in Figures 1 and 3, to telescope the reel **39** within the stakes of the coil transferring frame **11** at the initiation of the operation of laying wire onto said reel.

The admission and release of fluid under pressure to the piston rod end of the cylinder **63** may be through a control valve **91** diagrammatically illustrated in Figure 3. The control valve **91** may be connected with a suitable source of fluid under pressure, such as a tank and pump (not shown) by means of a fluid pressure line **92**. The control valve **91** may include a bleeder or needle valve (not shown). The needle valve may be of a well known form and is provided to release fluid from the piston rod end of the cylinder **63** at a controlled rate, and accommodate the lowering of the platform **40** by gravity by the weight of the wire thereon, at a rate sufficient to maintain tension on the wire. The rate of release of fluid from the cylinder **63** through the valve **91** may be varied to provide the desired tension on the wire **19** and to prevent kinking or tangling thereof. A pressure line **93** may also lead to the head end of the cylinder **63**, and admit fluid under pressure thereto when desired.

In operation of the hydraulic lift and tensioning let down, when initially starting the coiling operation, an empty reel **39** may be laid on the arms **43, 43** of the platform **40**, it being understood that said arms may be manually moved from a spread to a closed position upon raising of the platform **40** above the spreader wedge **53**. Fluid under pressure may then be admitted to the piston rod end of the cylinder **63** under control of the valve **91**, to raise the carriage **40** along the vertically extending guide track **55** and telescope the reel **39** within the open framework of the guide frame **11**.

Assuming the wire layer is in operation, the free end of the wire may be suitably attached to the wire reel **39**. The wire will then be laid on to said reel in the form of a coil conforming to the diameter of the coil transfer frame **11** in a manner similar to that shown and described in my Patent No. 2,629,564 previously referred to. As the weight of the wire coiled on the reel **39** increases, the bleeder valve **91** will release fluid from the piston rod end of the cylinder **63**, accommodating the carriage **44** and platform **40** to lower by gravity against the reaction offered to the release of fluid from the cylinder **63** by the bleeder valve **91**. The rate of release of fluid under pressure from the cylinder **63** may be such as to provide a uniform coil on the reel **39** and to maintain sufficient tension on the wire **19**, to coil on the reel **39** without kinking or tangling, it being understood that the coil transferring framework **11** provides a substantial storage space for wire being laid thereon and dropping therefrom onto the reel **39**.

As the reel **39** is substantially full, the spaces between the arms **51, 51** will come into engagement with the wedge **53**, causing said arms to gradually spread outwardly by the weight of the coil thereon and deposit the coiled reel onto the ground or onto a pallet **46** for transportation from the wire layer. At this time the end of the wire may be snipped and secured to one of the stakes of the reel **39**.

The reel and coiled wire being removed, the platform **40** may be lifted by the admission of fluid under pressure to the head end thereof a distance sufficient to accommodate the arms **43, 43** to be manually closed. Another reel **39** may then be placed thereon. The reel may then be raised within the transfer frame **11** and the coiling operation may be continued, as previously described.

I claim as my invention:

1. In a hydraulic tensioning device and let down for wire layers having a coiling block, means for laying wire on said block, and coil transfer means extending from said block downwardly to discharge the wire laid thereon toward the ground, a wire reel telescopically movable into said coil transfer means, a vertically guided spreadable platform for supporting and moving said reel within said coil transfer means, and hydraulic let down means for said reel and platform, lowering said reel and platform by the weight of the wire thereon at a controlled rate, to maintain sufficient tension on the wire during coiling thereof on said reel to prevent tangling thereof, and means operable by lowering movement of said platform for releasing said platform from the reel at the lower extremities of its travel by spreading said platform to accommodate the reel to drop by gravity.

2. In a hydraulic tensioning device and let down for wire layers having a coiling block, a winding member for laying wire on said coiling block and coil transfer means extending horizontally from said coiling block and directed downwardly therefrom to discharge the wire laid thereon toward the ground, the improvements comprising a spreadable platform movable toward and from the discharge end of said coil transfer means, a wire reel adapted to be mounted thereon and lifted thereby to telescopically extend within said coil transfer means, said platform comprising two vertically pivoted arms normally in engagement with each other and vertically guided for movement toward and from said coil transfer means, hydraulic cylinder and piston means for moving said platform toward said coil transfer means and letting said platform down at a controlled rate by the weight of the wire thereon, and camming means adjacent the ground, engaging between said arms upon lowering movement thereof to spread the same to re-

lease said reel and the wire coiled thereon to drop therefrom.

3. In a hydraulic tensioning device and let down for wire layers having a coiling block, means for laying wire on said coiling block, and coil transfer means extending horizontally from said coiling block and directed downwardly therefrom to discharge the wire laid thereon toward the ground, the improvements comprising a spreadable platform including two spreadable vertically guided support arms, hydraulic cylinder and piston means connected with said arms for vertically moving the same toward and from said coil transfer means to extend a reel on said platform within said transfer means, valve means releasing fluid from said cylinder and piston means at a controlled rate, to lower said reel by the weight of the wire coiled thereon and maintain tension on the wire laid on the reel supported thereon, and wedging means engageable between said arms upon lowering movement thereof and spreading said arms at the end of lowering movement thereof to release a reel having the wire coiled thereon to drop from said platform by gravity.

4. In a hydraulic tensioning device and let down for wire coiling devices having a coiling block, means for laying wire on said coiling block in the form of a coil and coil transfer means extending from said coiling block and directed to discharge the wire laid thereon toward the ground, a wire reel movable within said coil transfer means, support means for said reel for telescopically moving said reel within said coil transfer means and letting said reel move downwardly therefrom by the weight of the wire coiled thereon comprising a spreadable platform for supporting said reel and including two vertically guided support arms mounted for pivotal spreading movement about spaced adjacent vertical axes, hydraulic cylinder and piston means connected with said arms for vertically moving the same, a bleeder valve controlling lowering movement of said arms and reel, in accordance with the weight of the wire coiled thereon, and means engaging between said arms and spreading the same at the lower end of vertical movement thereof, and accommodating the loaded reel to drop therefrom by gravity.

5. In a hydraulic tensioning device and let down for wire layers having a coiling block, a winding member for laying wire on said block, and coil transfer means extending from said block and directed to discharge wire laid thereon toward the ground, the improvements comprising a frame, vertically extending guide tracks extending upwardly from said frame, a carriage guided for movement along said guide tracks, a hydraulic cylinder and piston spaced from said guide tracks, a flexible draft device operated thereby and having connection with said carriage for raising and lowering the same along said guide tracks, a platform supported on said carriage comprising two support arms pivotally mounted on said carriage for movement about two closely spaced vertical axes and projecting therefrom, a reel supported on said platform and telescopically moved thereby within the coil transfer means, for the coiling of wire thereon and let down by said platform by gravity in accordance with the weight of the wire thereon at a controlled rate to maintain sufficient tension on the wire on said coil transfer means to prevent kinking thereof, and a spreading member mounted on said frame adjacent the ground and extending upwardly therefrom for engagement between said arms to spread said arms upon downward movement of said platform and to release the reel with the wire coiled thereon, to drop therefrom by gravity.

6. In a hydraulic tensioning device and let down for wire layers having a coiling block, a winding member for laying wire on said coiling block, and coil transfer means extending therefrom and directed to discharge the wire laid thereon toward the ground, a wire reel fitting within said coil transfer means, support means therefore comprising a vertically movable platform, a guide frame for said platform comprising two vertically extending facing guide tracks, a carriage guided for movement along said guide tracks, a hydraulic cylinder and piston spaced from said support frame, a flexible draft device operatively connected therewith and to said carriage, for vertically moving the same upon extensible and retractable movement of said piston, said platform comprising two vertically pivoted arms pivotally supported on said carriage adjacent their inner ends and extending therefrom for movement about two closely spaced vertical axes, a spreading wedge on said frame facing said arms for engagement therebetween to pivot said arms by gravity and spread said arms to release the reel therefrom, and a bleeder valve connected with said cylinder and piston and bleeding fluid therefrom at a controlled rate, to lower said carriage and platform by gravity in accordance with the weight of the wire thereon.

7. In a hydraulic tensioning device and let down for wire layers having a coiling block, a winding member for laying wire on said coiling block, and a coil transfer means extending from said coiling block and including an open framework directed from said coiling block to discharge the wire laid thereon toward the ground, the improvements comprising a vertically movable platform, a reel adapted to be supported on said platform and elevated thereby within said open framework at the initiation of the coiling operation, said platform comprising two horizontally extending support arms of semi-annular form in plan, a carriage guided for vertical movement, means pivotally mounting said support arms at their inner ends on said carriage for movement toward each other to form a generally annular platform and for movement away from each other to release the reel therefrom, hydraulic cylinder and piston means for raising and lowering said carriage and arms, and wedging means engaging between said arms at the lower end of travel thereof and spreading said arms to release the reel with the wire coiled thereon by gravity.

8. In a hydraulic tensioning device and let down for wire layers having a coiling block, means for laying wire on said coiling block in the form of a coil and coil transferring means extending from said coiling block and comprising an open framework directed to discharge wire laid thereon toward the ground, a wire reel movable within said open framework to initiate the coiling operation, a frame, a vertical guide track extending along said frame, a carriage guided for movement along said guide track, a cylinder and piston having a piston rod extensible therefrom, a flexible draft device connected with said piston rod and carriage for vertically moving the same upon extensible and retractable movement of said piston rod within said cylinder, and a platform for said reel supported on said carriage for movement therewith and comprising two support arms of a semi-annular form, pivoted to said carriage adjacent their inner ends for movement about two closely spaced vertical axes and forming an annular platform when closed, and an upwardly facing wedge on said frame facing said arms for engagement therebetween to spread the same and release said reel to drop by gravity at the lower end of travel of said platform.

9. In a hydraulic lift and tensioning let down for a wire coiling device having a downwardly facing coil transfer frame opening toward the ground, a frame having a vertically extending guide track, a carriage guided for movement along said guide track, a hydraulic cylinder spaced from said frame and having a piston rod extensible therefrom, a flexible draft device operatively connected with said piston rod and carriage for vertically moving the same along said guide track upon extensible and retractable movement of said piston rod with respect to said cylinder, a platform supported on said carriage and forming a support for a wire reel, for vertically extending the reel within said coil transfer frame and letting the reel down by the weight of wire thereon by gravity, said platform comprising two support arms pivotally mounted on said carriage for movement about two closely spaced vertical axes, valve means releasing fluid under pressure from said cylinder at a controlled rate to accommodate said carriage and platform to descend by gravity, and camming means spreading said arms at the end of lowering movement thereof.

10. In a hydraulic lift and tensioning let down for a wire coiling device having a coil transfer frame opening toward the ground, a frame having a vertically extending guide track, a carriage guided for movement along said guide track, a horizontally extending cylinder spaced from said frame and connected thereto, a piston rod extensible from said cylinder and having a direction changing device on the end thereof, a flexible draft device connected to said frame at one end, changing its direction about said direction changing device intermediate its ends and connected with said carriage at its opposite end for vertically moving the carriage along said guide

track, a platform supported on said carriage and adapted to have a wire reel supported thereon for vertically moving the same within said coil transfer frame and letting the same down at a controlled rate by gravity in accordance with the weight of the wire thereon, said platform comprising two arms of a semi-annular formation, pivoted adjacent their inner ends to said carriage for movement about closely spaced vertical axes and forming a generally annular support platform when closed, a wedge on said frame adjacent the ground and having an apex facing said arms adjacent the inner ends thereof, for engagement therebetween to spread said arms upon lowering movement thereof and release the reel supported thereon by gravity.

11. In a hydraulic lift and tensioning let down for a wire coiling device having a coil transfer frame opening toward the ground, a frame having a vertically extending guide track, a carriage guided for movement along said guide track, a horizontally extending cylinder spaced from said frame and connected thereto, a piston rod extensible from said cylinder and having a direction changing device on the end thereof, a flexible draft device connected to said frame at one end, changing its direction about said direction changing device intermediate its ends and connected with said carriage at its opposite end for vertically moving the carriage along said

guide track, a platform supported on said carriage and adapted to have a wire reel supported thereon for vertically moving the same within said coil transfer frame and letting the same down at a controlled rate by gravity in accordance with the weight of the wire thereon, said platform comprising two arms of a semi-annular formation, pivoted adjacent their inner ends to said carriage for movement about closely spaced vertical axes and forming a generally annular support platform when closed, a wedge on said frame adjacent the ground and having an apex facing said arms adjacent the inner ends thereof, for engagement therebetween to spread said arms upon lowering movement thereof and release the reel supported thereon by gravity, and valve means controlling the release of fluid under pressure from said cylinder and the lowering of said platform comprising a bleeder valve releasing said fluid from said cylinder at a controlled rate to lower said platform at a rate sufficient to maintain tension on the wire thereon.

References Cited in the file of this patent

UNITED STATES PATENTS

2,149,851	MacLeod	Mar. 7, 1939
2,216,224	Bruestle	Oct. 1, 1940
2,629,564	Bell	Feb. 24, 1953