May 18, 1948. W. V. LARNER 2,441,639

WIRE PAY-OFF REEL

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Fig. 2.

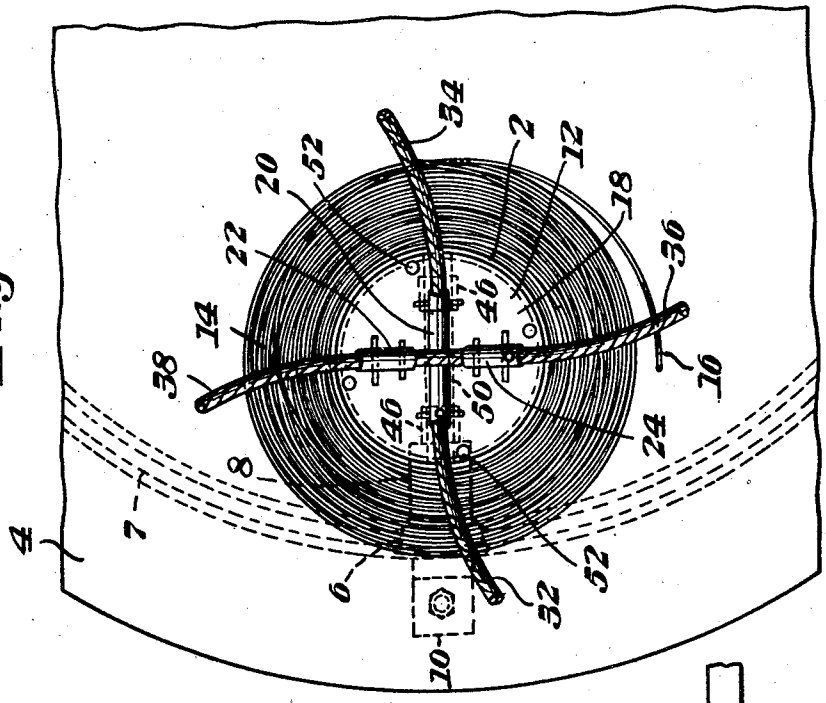

Fig. 1.

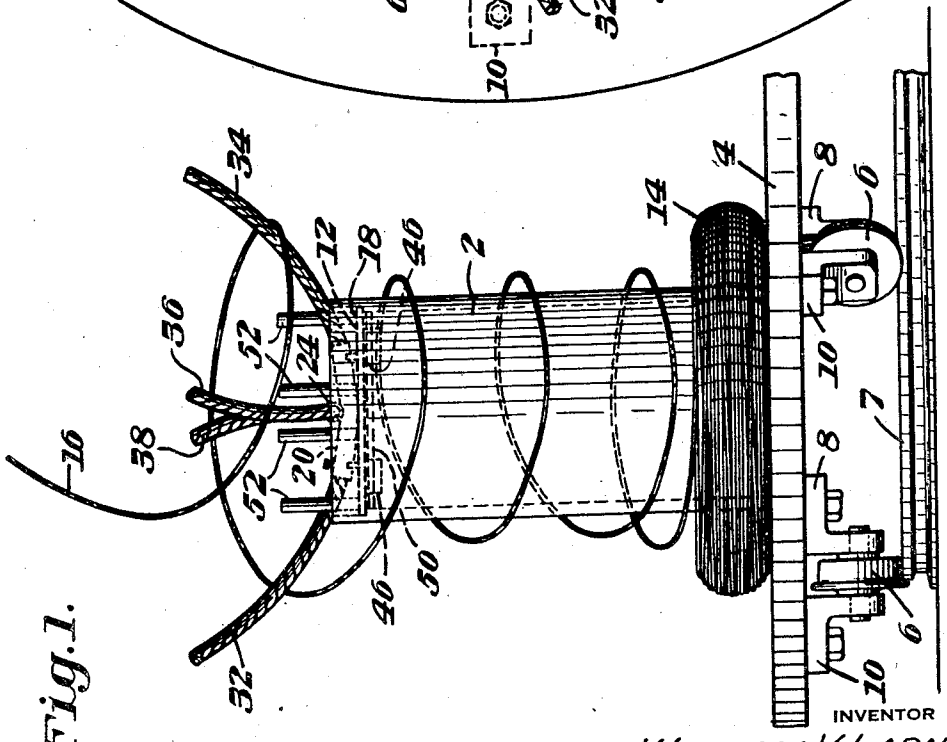

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Fig. 3.

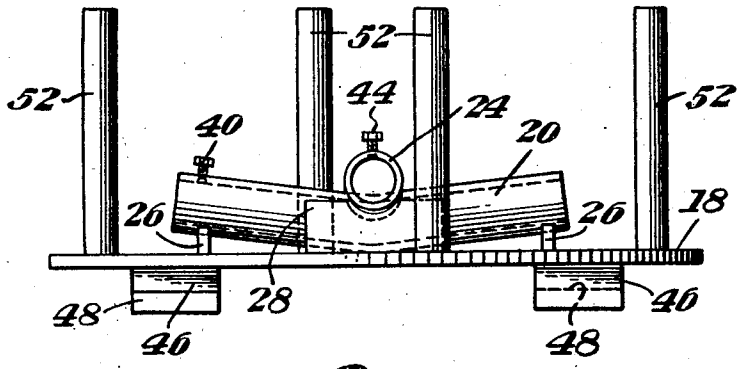

Fig. 4.

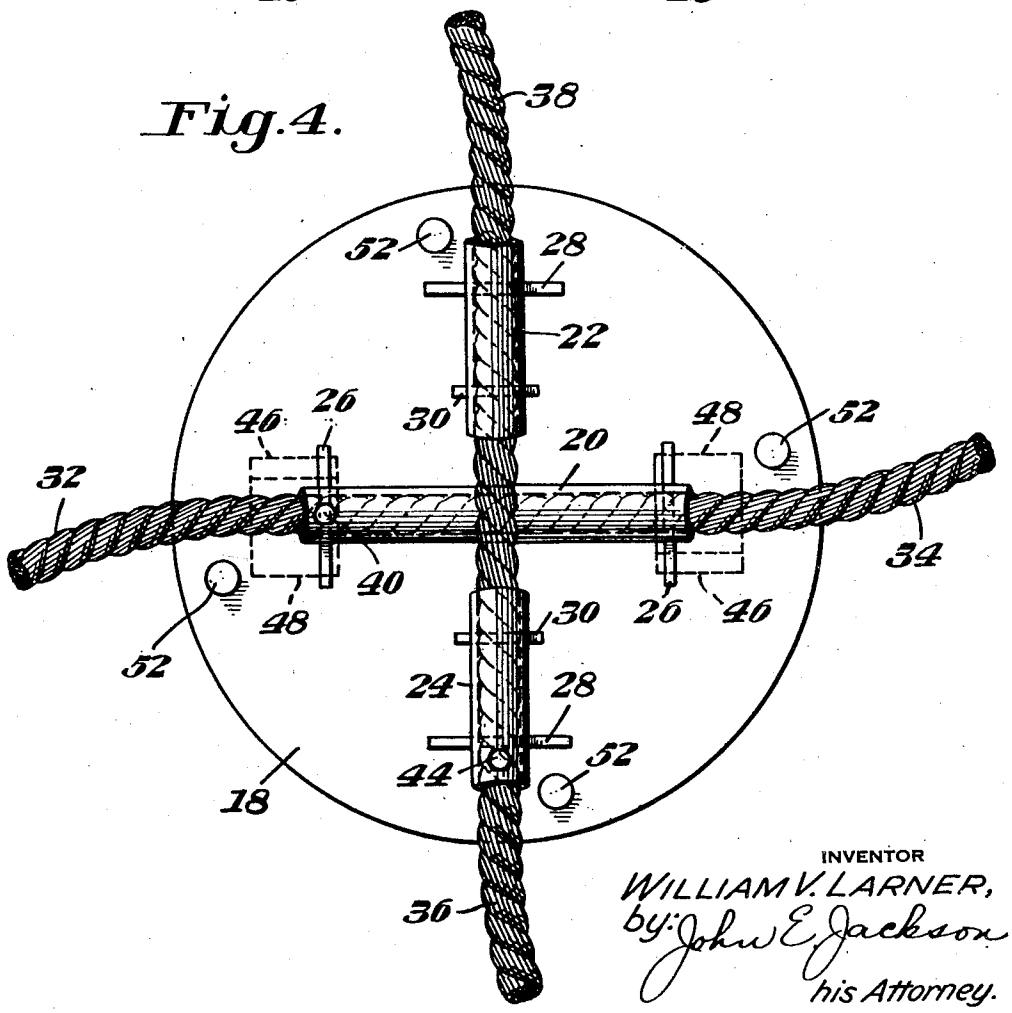

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Fig.5.

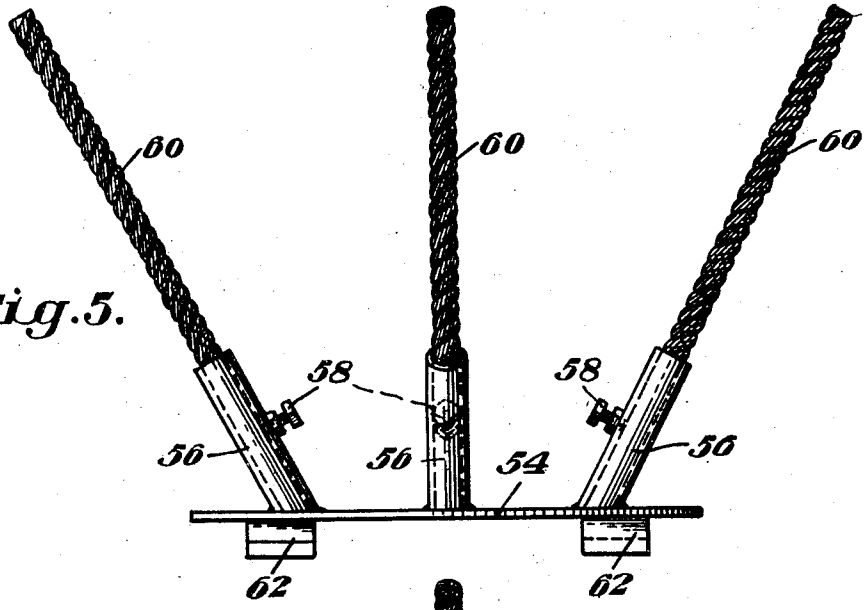
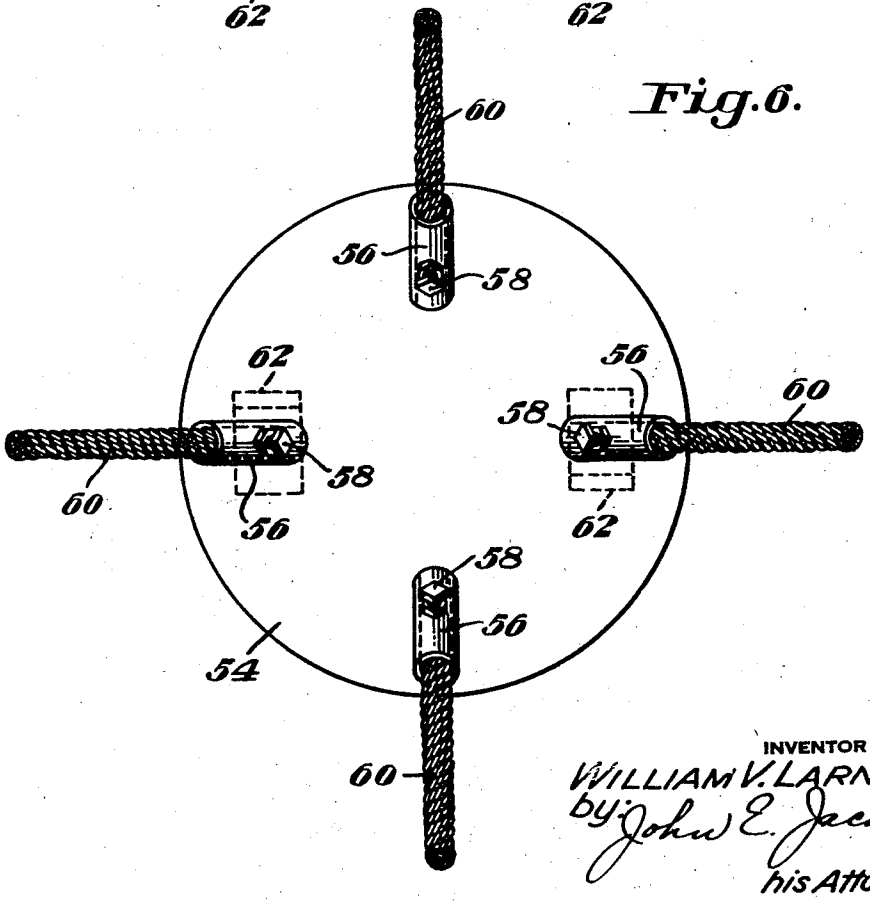


Fig.6.



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Patented May 18, 1948 2,441,639

UNITED STATES PATENT OFFICE

2,441,639

WIRE PAY-OFF REEL

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Application December 29, 1944, Serial No. 570,352

10 Claims. (Cl. 242—129)

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This invention relates to a pay-off reel for feeding wire from coils or bundles.

Among the objects of the invention is the provision of an improved pay-off reel permitting the high-speed feeding of wire from coils or bundles.

Another object of the invention is the provision of such pay-off reel, the construction of which is such as to prevent the forming of snarls and tangles between adjacent convolutions of the coils or bundles during feeding.

These and further objects of the invention will appear in the following description.

In the feeding of devices such as wire fabricating machines with wire it is convenient and customary to supply the wire to the machine from coils or bundles, such coils or bundles being supported coaxially on pay-off reels with the ends of adjacent bundles welded together to permit the continuous feeding out of the wire from the several bundles. By the term "wire" as used herein there is meant to include rods of such gauge that they may be fed in such manner, as well as products ordinarily known as wire. In the conventional feeding of fabricating machines by wire, as mentioned above, particularly at high speeds, several convolutions from the bundle are frequently pulled out therefrom by the wire being fed to the machine. In order to eliminate tangles which would result from the pulling together of such convolutions and to prevent their being carried, with the wire being fed, to the guiding sheave or the like where it would jam the wire and stop its progress in the machine, there has been provided on the feeding-off end of the pay-off reel means intended to separate the convolutions of the wire and to eliminate the feeding off of all but the terminal portion of the wire. Such coil separators have frequently taken the form of rings mounted on the pay-off end of the reel so that they are slightly spaced from the reel, such rings being made of greater diameter than the reel so that the wire being fed off in a line coaxial of the reel follows progressively around the separator ring.

Such prior art separator rings have proved to have a certain value for separating convolutions of the coils, and have consequently enjoyed quite extensive use. They fail, however, to separate a snarl or tangle which has started in the wire any great distance from the separator and has become pulled progressively tighter as it has traveled toward the pay-off end of the reel. Such snarls are not infrequent, since no particular care is taken in the manner of laying up the convolutions in the bundles, and since the subsequent handling of the bundles is apt to displace convolutions so that they interlock in the bundle.

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The present invention provides a construction of a coil separator having yielding resilient arms with which the wire being fed off progressively comes into contact. By reason of such yielding wiping contact of the arms with the wire and by reason of the fact that the wire progressively travels over the ends of each of a plurality of such yielding arms which then snap back to their normal positions, adjacent convolutions of the wire are automatically separated.

The invention will be more readily understood by reference to the accompanying drawings, in which:

Figure 1 is a view in side elevation of the reel and coil separator of the present invention;

Figure 2 is a view in plan of the reel and coil separator shown in Figure 1;

Figure 3 is a view in side elevation of the coil separator employed with the apparatus shown in Figures 1 and 2, the resilient arms being removed;

Figure 4 is a view in plan of the coil separator shown in Figure 3 with the resilient arms in place;

Figure 5 is a view in side elevation of a modification of the coil separator; and

Figure 6 is a plan view of the modification of the coil separator shown in Figure 5.

The pay-off reel of the present invention consists of a cylindrical or substantially cylindrical core 2 which may be positioned on any suitable support in such relationship to the device being fed that the axis of the reel lies substantially in the vertical line through which the wire is fed. As shown in Figure 1, the reel may be supported upon a circular table 4 supported by means of flanged wheel 6 on circular track 7 through the medium of the inner and outer wheel supporting brackets 8 and 10, respectively. Located on top of reel 2, which in the embodiment shown is hollow, is the coil separating device indicated generally by the reference character 12. A bundle of wire 14 located on core 2 is shown in Figure 1 with its free end 16 being pulled upwardly therefrom so that it travels in a generally vertical direction over a feed sheave, (not shown) into any desired device such as a fabricating machine. Such sheave, which is preferably mounted a substantial distance above the core 2 with its entering side substantially tangent to the axis of the core, in order to insure uniformity of action of all the coil separator arms, subsequently to be described, may conveniently be one shown and

described in the patent to Lisy, No. 2,349,873, dated May 30, 1944.

The coil separating device 12, which is more fully shown in Figures 3 and 4, consists of a cylindrical head plate 18 of such diameter that it fits snugly within the hollow upper end of reel 2 on top of a shoulder formed on its inner surface as shown in Figure 1. On the upper surface of head plate 18 is positioned a section of bent pipe 20, with the center of the pipe in contact with and secured to the center of plate 18. The upwardly directed ends of pipe 20 are braced and secured to plate 18 by means of spacer bars or cradle blocks 26, which may have slight depressions in the upper surfaces thereof upon which the bottom surface of the pipe may rest to insure stable mounting thereof. Pipe 20 and the spacer bars 26 may be conveniently held together and to the head plate 18 by means of welding.

Also located on top of head plate 18 and likewise located in substantially radial relationship therewith are two short pieces of pipe 22 and 24. In order to allow the use of two long pieces of cable to form the four resilient arms of the coil separating device, pipes 22 and 24 are elevated above pipe 20 by means of outer and inner spacer bars or cradle blocks 28 and 30, respectively. Blocks 30 are made of somewhat less height than blocks 28 in order to give the arms supported by pipes 22 and 24 approximately the same upward tilt as those supported by pipe 20. Resilient arms 32 and 34, which are made of twisted wire cable, are made in one piece, with the center thereof extending through pipe 20. Arms 36 and 38, likewise made of twisted wire cable, are integral as shown, portions on each side of the center passing through pipes 22 and 24. Set screws 40 and 44 in pipes 20 and 24, respectively, are screwed down onto the cables after they are in place and hold the cables securely against lengthwise displacement.

The cylindrical head plate of the coil separating device is provided on its bottom surface with two oppositely directed L-shaped brackets 46, as shown in Figures 3 and 4. Such brackets cooperate with the diametral bar 50 of substantial breadth which is fitted across the inside of the top of the reel 2, the upper surface of bar 50 substantially coinciding with the plane of the shoulder in the core on which plate 18 rests, as shown in Figure 1, and is connected to the reel as by welding. When the coil separator is placed within the upper end of the reel on bar 50 and is turned to engage the horizontal portions of the brackets 46 under the bar, it is held stably against displacement. Preferably the horizontal portions of brackets 46 engaging the bottom of bar 50 are so directed relative to the direction of unwinding of the coil or bundle that the tendency is to tighten them against the bar 50. The coil separating device may be easily placed on the reel or removed therefrom by grasping upstanding handles 52 welded to the top of plate 18.

The action of the resilient arms 32, 34, 36, and 38 will be more fully understood by a consideration of Figure 1, in which the end of the coil 14 being discharged has progressively contacted arms 32, 36, 34, and 38 in its progress from the top of the reel to a point where it has completely freed itself from the resilient arms. To reach the latter point, the wire must travel so that it snaps progressively over the end of each of the resilient arms, each of which then returns to its former position, separating the convolution which has passed from the one or ones immediately following. Thus, the resilient arms act like interleaving fingers which yield sufficiently to avoid the aggravation of snarls or tangles but yet at the same time have sufficient rigidity to constitute an effective separator between convolutions. The dimensions of the twisted cable suitable for such use naturally vary with the type of wire or rod being fed off the pay-off reel. It is preferred that a spring wire cable be employed and that the cable be of the so-called "inert lay" type, that is, one in which the elements have been so preformed that they have no inherent tendency to unravel. In order to prevent fraying of the ends, which are obviously subjected to considerable wear as the wire travels over them, the strands of the cable should be secured together at their ends as for instance by being welded in such manner that the ends are smooth and of substantially the same diameter as the remainder of the arms.

The modification of the coil separator, shown in Figures 5 and 6, has also been found to be useful particularly in applications where the lighter gauge wires are to be fed. In this modification, the cylindrical head plate 54 is provided on the top thereof with four cylindrical brackets 56, the bases of which are disposed at an angle to their axes. Brackets 56 are welded to plate 54 at points spaced equally from the center of the plate and with the axes of the brackets extending upwardly and outwardly in substantially radial planes. Four separate lengths of twisted wire cable 60 are provided, one for each bracket, and the cable is held in the brackets by means of set screws 58 which may be tightened up against the portions of the cables within the brackets. The coil separator of this modification is retained upon the reel in the same manner as that of the first modification, namely, by being provided with two oppositely directed L-shaped brackets 62 on the bottom of the head plate, such brackets cooperating with the crossbar positioned at the top of the pay-off reel in the manner previously described.

The coil separator, shown in Figures 5 and 6, allows the feeding of a wire thereover with the use of less tension than is necessary with the use of the separator shown in Figures 1 to 4, inclusive. This follows as a result of the much greater angle which the resilient separator arms present in the second modification to the horizontal, thereby allowing the convolutions of the wire being fed to slip up the arms more easily. Such construction is especially useful where finer gauge wires are to be fed, and where it is not desired to subject them to too much tension. At the same time, arms 60 perform essentially the same function as that of arms 32, 34, 36, and 38, that is, they provide resilient yielding fingers which progressively interleave between the adjacent convolutions of the wire, thereby separating snarls and tangles between adjacent convolutions which may reach the separator.

Whereas I have illustrated and described preferred modifications of the improved pay-off reel and coil separator of the present invention, it is to be understood that the invention is capable of numerous variations obvious to those skilled in the art. The scope of the present invention is therefore to be defined by the appended claims.

I claim:

1. A wire pay-off reel comprising a core adapted to receive one or more annular bundles of wire thereover, a support for said core, and a coil separator affixed to the end of the core from which the wire is discharged, said coil separator

comprising a support attached to the discharge end of the core, a plurality of angularly spaced coil separator arm securing members on the coil separator support directed in planes which are at least substantially radial of the core, and resilient coil separating arms projecting a substantial distance from the core held by the arm securing means, whereby wire drawn off a wire bundle on the core in a direction at least substantially axially of the core deflects the resilient arms and travels over their ends successively.

2. A wire pay-off reel comprising a vertical core adapted to receive one or more annular bundles of wire thereover, a support for such core, and a coil separator affixed to the upper end of the core, from which the wire is discharged, said coil separator comprising a support of at least substantially the same size as the cross-section of the core attached to the core, a plurality of angularly spaced coil separator arm securing members on the coil separator support directed in planes which are at least substantially radial of the core, and resilient coil separating arms held by the arm securing members and projecting a substantial distance from the core, whereby wire in the topmost convolution of wire drawn off a wire bundle on the core in a direction at least substantially axially of the core deflects the resilient arms and travels over their ends successively.

3. A wire pay-off reel as set out in claim 2, in which the resilient arms are made of twisted wire cable, said arms having substantial stiffness and yet having sufficient resilience to be deflected markedly as the wire being fed travels outwardly thereof and to regain substantially a radial position after the wire has passed the end thereof.

4. A wire pay-off reel comprising a vertical substantially cylindrical core adapted to receive one or more annular bundles of wire thereover, a support for such core to which the bottom of the core is attached, and a coil separator affixed to the upper end of the core, from which the wire is discharged, said coil separator comprising a support of at least substantially the same diameter as the core attached to the core, a plurality of coil separator arm securing members attached to the coil separator support in substantially uniformly angularly spaced radial planes, and resilient coil separating arms held by the arm securing members and projecting a substantial distance from the core, said arms being directed at least slightly upwardly, whereby wire in the topmost convolution of wire drawn off a wire bundle on the core in a direction at least substantially axially of the core deflects the resilient arms and travels over their ends successively.

5. A wire pay-off reel as set out in claim 4, in which the resilient arms are made of twisted wire cable, said arms having substantial stiffness and yet having sufficient resilience to be deflected markedly as the wire being fed travels outwardly thereof and to regain substantially a radial position after the wire has passed the end thereof.

6. A wire pay-off reel comprising a hollow substantially cylindrical core adapted to receive one or more annular bundles of wire thereover, a support for such core, said core having a diametrally placed bar across the inside thereof at the discharge end thereof, and a coil separator affixed to the end of the core from which the wire is discharged, said coil separator comprising a plate fitting closely within the hollow discharge end of the core, oppositely disposed L-shaped brackets on the bottom of said plate cooperating with the diametral bar in the core to hold the plate in place in the core, a plurality of coil separator arm securing members attached to the top of the plate in substantially uniformly angularly spaced radial planes, and resilient coil separating arms held by the arm securing members and projecting a substantial distance from the core, said arms being directed at least slightly upwardly, whereby the wire in the topmost convolution of wire drawn off a wire bundle on the core in a direction at least substantially axially of the core deflects the resilient arms and travels over their ends successively.

7. A wire pay-off reel comprising a core adapted to receive one or more annular bundles of wire thereover, a support for such core, and a coil separator affixed to the end of the core from which the wire is discharged, said coil separator comprising a coil separator supporting plate attached to the discharge end of the core, a plurality of angularly spaced tubes on the coil separator supporting plate directed outwardly of the core in planes which are at least substantially radial of the core and at a marked angle to the horizontal, said tubes having the bottom ends thereof disposed at an angle to their axes and affixed to the supporting plate, and separate coil separating arms held in each tube and projecting a substantial distance from the core, the arms being stiff but resilient so that the wire drawn off a wire bundle on the core in a direction at least substantially axially of the core deflects the arms and travels over their ends successively.

8. A wire pay-off reel comprising a core adapted to receive one or more annular bundles of wire thereover, a support for such core, and a coil separator affixed to the end of the core from which the wire is discharged, said coil separator comprising a coil separator supporting plate attached to the discharge end of the core, three angularly spaced tubes on the coil separator supporting plate directed in planes which are substantially radial of the core, one such tube being long and extending substantially equal distances on both sides of the center of the supporting plate, the ends of such long tube extending at slight angles away from the supporting plate, the other two tubes being short and being located on a common diameter substantially at right angles to the long tube, the two short tubes extending toward the center of the supporting plate but short of the first tube, the two short tubes being also slightly inclined upwardly in directions from the center of the supporting plate, the ends of the short tubes centrally of the supporting plate being spaced from such plate a distance different from that at which the center of the long tube is spaced from the center of the supporting plate, coil separating arms held by the tubes projecting a substantial distance from the core, opposite arms being integral, the central portion of the member forming the arms held by the two short tubes crossing the center of the long tube, the arms being stiff but resilient so that wire drawn off a wire bundle on the core in a direction at least substantially axially of the core deflects the arms and travels over their ends successively.

9. A wire pay-off reel comprising a core adapted to receive one or more annular bundles of wire thereover, said core having an outside diameter less than the diameter of the annular openings of the bundles of wire to be placed thereon, and a coil separator affixed to the end of the core from

which the wire is discharged, the discharge end of the core member being otherwise unobstructed, said coil separator comprising a plurality of angularly spaced resilient arms projecting a substantial distance in approximately radial planes beyond the core, whereby wire drawn off a wire bundle on the core in a direction at least substantially axially of the core deflects the resilient arms and travels over their ends successively.

10. A wire pay-off reel comprising a substantially vertical core adapted to receive one or more annular bundles of wire thereover, a support for said core, the top of said core having an outside diameter less than the diameter of the annular openings of the bundles of the wire to be placed thereon, and a coil separator affixed to the top of the core, said coil separator comprising a plurality

of angularly spaced resilient arms projecting a substantial distance in approximately radial planes beyond the core, whereby wire drawn off a wire bundle on the core in a direction at least substantially axially of the core deflects the resilient arms and travels over their ends successively.

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