July 8, 1958 V. A. RAYBURN 2,842,323

FLYER FOR SUPPLY STANDS

Filed Sept. 3, 1953 2 Sheets-Sheet 1

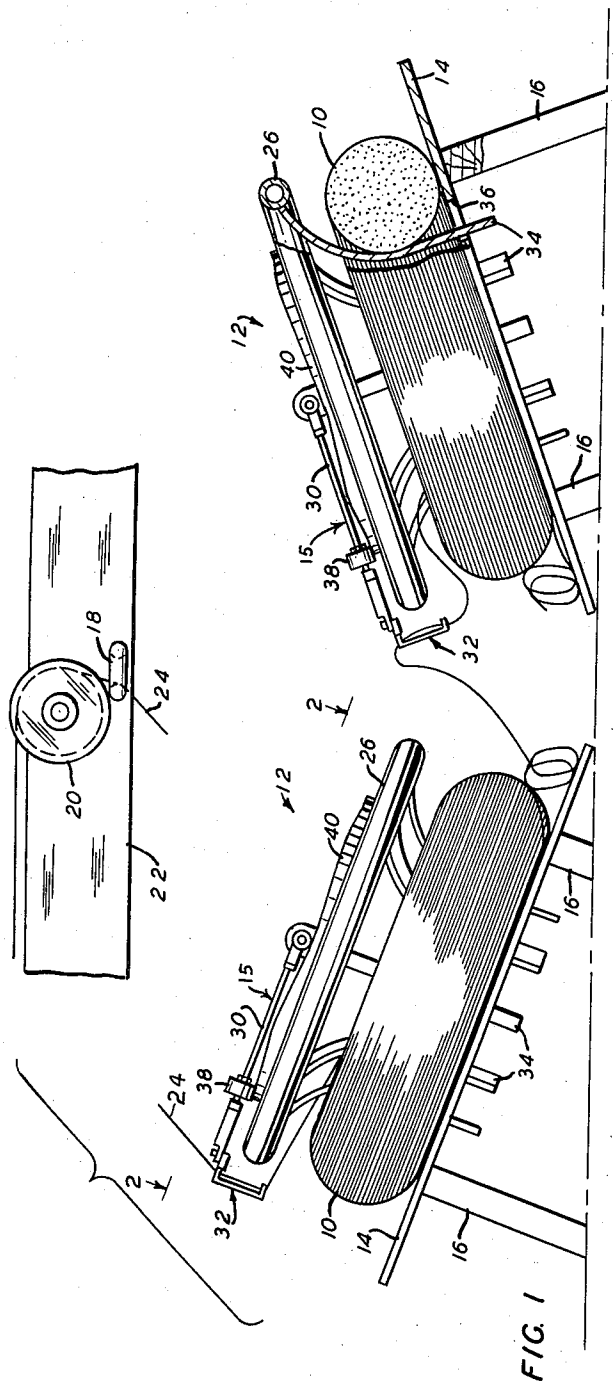


FIG. 1

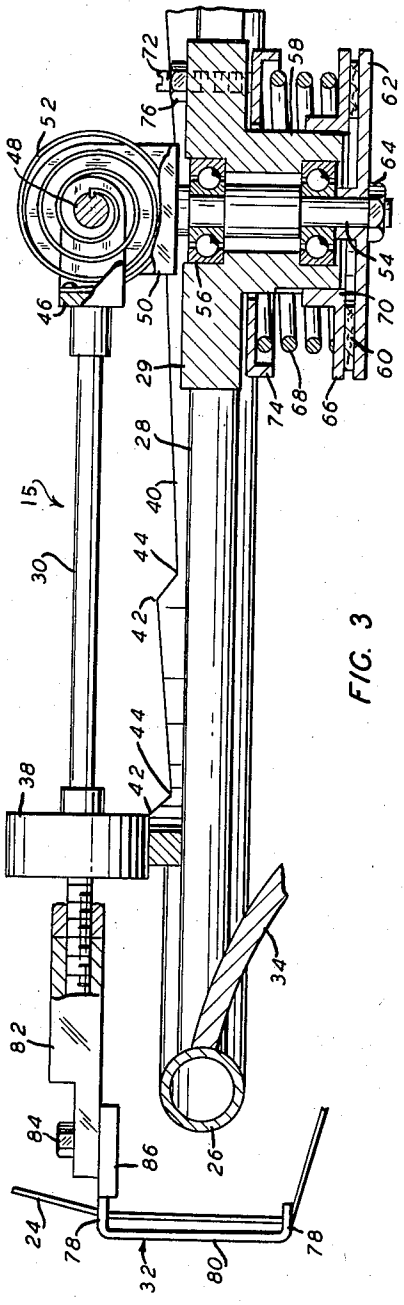


FIG. 3

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Filed Sept. 3, 1953 2 Sheets-Sheet 2

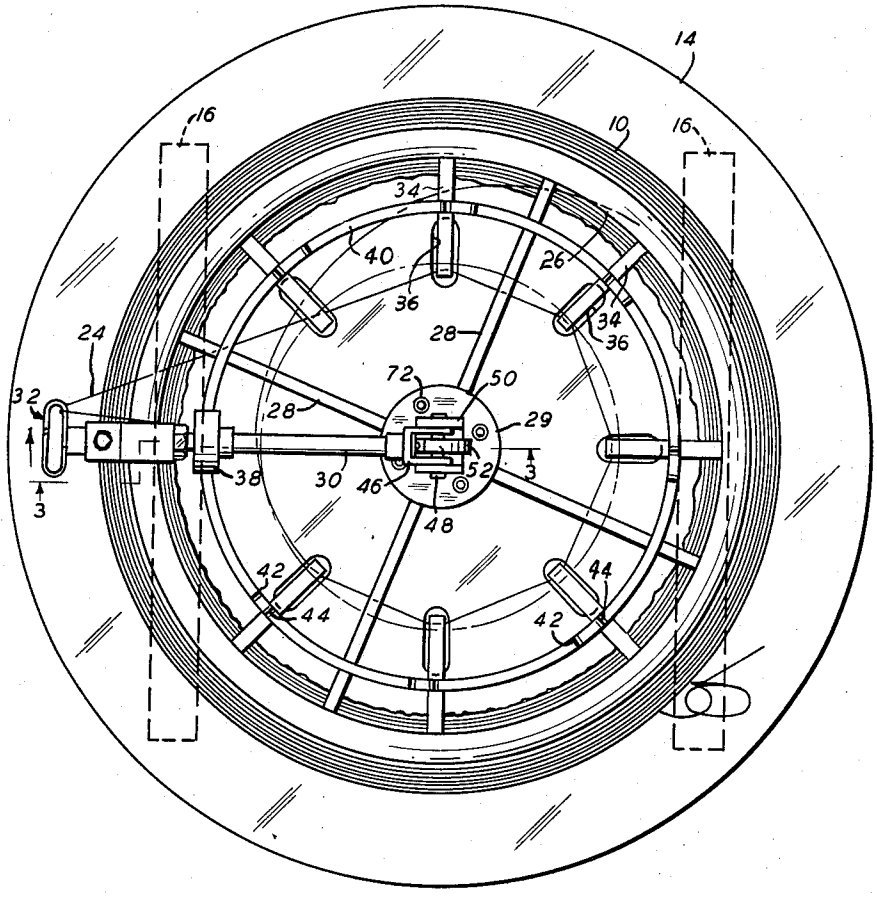


FIG. 2

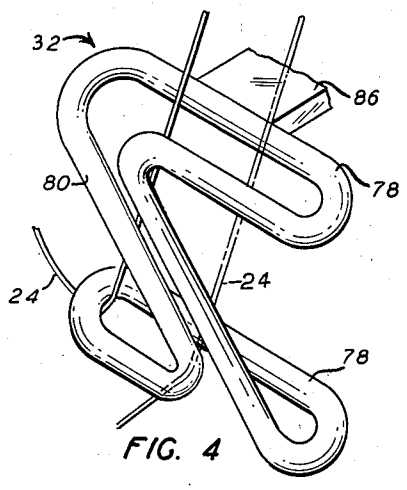


FIG. 4

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FLYER FOR SUPPLY STANDS

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8 Claims. (Cl. 242—128)

This invention relates to supply stands, and more particularly to supply stands having flyers for leading off filamentary material being uncoiled therefrom.

Stationary supply stands from which a filamentary material, such as steel wire, is supplied continuously by an over-end pay-off system, are usually provided with a rotatable flyer for guiding the off-coming wire. A coil of wire, known in the trade as a bundle of wire, is held stationary on the supply stand while the wire is pulled through the flyer off one end of the coil. The flyer functions as a wire guide which moves restrainedly with the wire around the periphery of the coil as each convolution thereof is pulled off. Although conventional flyers are helpful in reducing the occurrence of tangles and breaks, these difficulties still arise occasionally, especially when the convolutions of the coil are not all perfectly concentric or the wire is springy, as is usually the case in bundles of hard-drawn wire wound on the draw blocks of wire drawing machines.

An object of this invention is to provide new and improved supply stands.

Another object of the invention is to provide new and improved flyers for preventing tangles in filaments being uncoiled from supply stands.

An apparatus illustrating certain features of the invention may include an arbor designed to receive a coil of filamentary material, a flyer mounted rotatably on the arbor for guiding a filament being payed off from the coil, and means for oscillating the flyer during its rotation to prevent tangles from occurring in the filament.

A complete understanding of the invention may be obtained from the following detailed description of apparatus forming a specific embodiment thereof, when read in conjunction with the appended drawings, in which:

Fig. 1 is a fragmentary elevation of a supply stand having a flyer embodying the invention;

Fig. 2 is an enlarged plan view taken in the direction of the arrows 2—2 of Fig. 1;

Fig. 3 is an enlarged, fragmentary section taken along line 3—3 of Fig. 2, and

Fig. 4 is an enlarged, perspective view of a wire guide forming a portion of the flyer.

Referring to Fig. 1, a pair of circular bundles 10—10 of steel wire are mounted on a pair of adjacent arbors, generally designated 12—12, which are supported on top of a pair of flat platforms 14—14 having legs 16—16 designed to tilt the platforms toward each other. The inclination at which the platforms 14—14 are tilted is such that projections of the axes of the bundles 10—10 thereon converge upon a fixed eye 18 and a rotatable sheave 20 which are secured to a beam 22 suspended directly above the platforms. The eye 18 is spaced equidistantly from the platforms 14—14 so that wire being payed off from either one of the bundles 10—10 thereon, such as a leading end of wire 24 from the left hand bundle as seen in Fig. 1, will be guided to the sheave 20 and then pass around this sheave to a processing machine (not shown).

Each of the arbors 12—12 comprises a ring 26 having a plurality of spokes 28—28 (Fig. 2), which extend radially outward from a central hub 29. A radial arm 30 having a wire guide 32 secured to its outer end is mounted rotatably in the axial center of each ring 26, so as to function as a flyer, indicated generally at 15, in guiding wire being payed off from the bundles 10—10 thereof. Each ring 26 is provided with a plurality of arcuate prongs 34—34 which curve downwardly and inwardly from points spaced equally around the periphery of the ring. The prongs 34—34 bear against the inner periphery of the bundles 10—10 of wire and also pass through a plurality of matching slots 36—36 formed in each of the platforms 14—14.

At a point intermediate its ends, each arm 30 is provided with a roller 38 which functions as a cam follower riding on a circular cam 40 mounted concentrically with respect to the ring 26 on the spokes 28—28 thereof. The cam 40 is provided with a series of alternately arranged lobes 42—42 and dwells 44—44 (Fig. 3), which cause the arm 30 to oscillate vertically as it moves around the periphery of the ring 26 during its rotation. Although eight sets of the lobes 42—42 and dwells 44—44 are employed in the illustrated embodiment of the invention, this number may be varied to produce any desired frequency of oscillation per revolution of the arm 30. Furthermore, the relative height of the lobes 42—42 may be selected to attain the desired extent of vertical movement.

Each arm 30 is mounted pivotally as well as rotatably at the center of its ring 26. The inner end of each arm 30 is provided with a bifurcated portion 46 (Fig. 3) journalled on a shaft 48 which is secured to a yoke 50. A spiral, torsion spring 52 is coiled about the shaft 48 in the bifurcated portion 46 of the arm 30. The outer end of the spiral spring 52 is pinned to the arm 30, and the inner end of this spring is pinned to the shaft 48. The spring 52 constantly urges the arm 30 downwardly, thereby keeping the roller 38 in contact with the cam 40 and preventing the arm 30 from bouncing upwardly too far as the roller rides over the lobes 42—42 on the cam. Each yoke 50 is secured to the upper end of a vertical shaft 54 (Fig. 3) journalled within a bearing 56 having a housing 58 formed by a portion of the hub 29 on the spokes 28—28 of the ring 26, thereby rendering the arm 30 capable of both rotation and oscillation.

In order to prevent the arm 30 from rotating so fast that the wire guide 32 may overrun the convolutions of wire being uncoiled, a controlled amount of frictional drag is applied to the shaft 54 as it turns within the bearing 56 when the arm 30 rotates. An annular brake lining 60 (Fig. 3) rests on top of a disc 62 which is secured to the lower end of the shaft 54 by means of a nut 64. The lining 60 is interposed between the disc 62 and an annular flange 66 which is splined to the housing 58 of the bearing 56. A coiled compression spring 68 encircles the housing 58 of the bearing 56 and urges the flange 66 downwardly towards the disc 62, thereby compressing the lining 60 between them. The flange 66 is prevented from rotating on the housing 58 by means of a key 70, but the disc 62 rotates with the shaft 54 as the arm 30 rotates. Thus, the compression of the lining 60 by the nonrotating flange 66 creates frictional drag on the rotation of the disc 62.

The amount of frictional drag is controlled by adjusting a plurality of set screws 72—72 which extend threadedly through the hub 29 at points spaced uniformly around the bearing housing 58. The set screws 72—72 bear upon and press down an annular collar 74 which abuts the upper end of the coiled spring 68. After the set screws 72—72 have been adjusted, they may be secured by a plurality of lock nuts 76—76. The compression of the coiled spring 68 is varied by adjusting the set screws 72—72, which in turn varies the compression of the brake lining 60, thereby controlling the

frictional drag applied to the movement of the wire guide **32**.

As shown in Fig. 4, the wire guide **32** includes a pair of generally C-shaped portions **78—78** alined vertically and disposed in parallel horizontal planes spaced a short distance apart. One of the C-shaped portions **78—78** lies above the ring **26** and the other C-shaped portion lies below the ring, in order to guide the leading end of the wire **24** around the ring without allowing the wire to touch the ring. The pair of C-shaped portions **78—78** are connected by a slotted portion **80** which runs diagonally between the opposite ends of the C-shaped portions and communicates with the gaps in their C-shaped configuration.

The C-shaped portions **78—78** and the slotted portion **80** of the wire guide **32** are made in the form of a one-piece integral structure, by twisting a single length of rod into the proper configuration and butt-welding its ends together. The resulting rod structure defines the peripheral edges of a short length of tubing, oval in cross-section and having a diagonal slot on one side thereof. The wire guide **32** functions in the same way that such a diagonally slotted tube would function, but offers the advantage of having less weight. Similarly, the ring **26** and the arm **30** may be constructed from hollow tubing to reduce their weights.

The wire guide **32** is supported at the outer end of the arm **30** in such manner that its position may be adjusted in several different ways. A link **82** Fig. 3) threadedly engages the arm **30** and is secured by a bolt **84** to a dog ear **86** which is welded to the upper one of the C-shaped portions **78—78** of the wire guide **32**. By rotating the link **82** on the arm **30**, the wire guide **32** may be moved radially inwardly or outwardly with respect to the ring **26**, and also may be turned to swing the lower one of the C-shaped portions **78—78** arcuately upward either to lead or to trail the direction in which the wire guide is moving. Another adjustment is performed by swinging the wire guide **32** about the bolt **84** as a pivot, to lead or to trail the direction in which it is moving.

Operation

As in the case of conventional supply stands, after initially loading the bundles **10—10** of wire onto the pair of platforms **14—14** and placing the arbors **12—12** thereon, the wire is taken from the arbors alternately. That is, the wire is taken from one of the pair of arbors **12—12** while the other one of the arbors is kept in standby condition. The leading end of the wire on this standby arbor is joined by welding, or otherwise, to the trailing end of the wire on the bundle then being uncoiled. The moment the bundle being uncoiled becomes exhausted, pay-off operations are shifted automatically to the other arbor. The operator then places another bundle of wire on the exhausted arbor, which now becomes the standby arbor. In this manner, the wire is supplied continuously without interruption from a plurality of separate bundles which are unconnected until they are placed on the supply stand.

When one of the arbors **12—12** becomes exhausted, it is a simple matter for the operator to place a new bundle of wire thereon. The ring **26** is grasped manually and elevated to pull the prongs **34—34** completely out of the slots **36—36**. Then the new bundle of wire is placed flat on the platform **14**, the prongs **34—34** are reinserted into the slots **36—36**, and the ring **26** is lowered until the prongs bear against the inner periphery of the bundle of wire.

As the wire is payed off, the bundles gradually become smaller than the full sized bundles illustrated in Fig. 1, and the prongs **34—34** are thereby freed to slide gradually further down through the slots **36—36**. The effect of this action is to keep the wire guide **32** of the flyer **15** close to the remaining portion of the bundle of wire by moving the ring **26** downwardly as the bundle gradually becomes depleted. It has been found that keeping the wire guide close to the convolution of wire being uncoiled in this manner is helpful in eliminating the occurrence of tangles. Furthermore, by having the arbors **12—12** sink down in this manner as the coils thereon are unwound, the remaining convolutions of wire are held firmly in position on the platforms **14—14**.

The bundles **10—10** of wire are held stationary on the arbors **12—12** while the processing machine (not shown) pulls the wire off. As each convolution leaves, the force of the wire **24** passing through and against the inner surface of the wire guide **32** makes the arm **30** turn one revolution about the ring **26** of the arbor. As viewed in Fig. 2, the arm **30** rotates in a clockwise direction. The wire guide **32** may be adjusted to make the lower one of the C-shaped portions **78—78** thereof lead the convolution of wire being unwound from the coil **10**. In order to keep the arm **30** from rotating too fast, so that the wire guide **32** will not overrun the convolution of wire being unwound, the brake lining **60** is used to apply frictional drag to the rotation of the shaft **54** which rotates with the arm **30**. The amount of frictional drag is varied as desired by adjusting the set screws **72—72** and the lock nuts **76—76**.

During its rotation around the ring **26**, the wire guide **32** is caused to oscillate vertically by the movement of the roller **38** on the circular cam **40**. The outer end of the arm **30** alternately rises and falls as the roller **38** moves across the alternately positioned lobes **42—42** and dwells **44—44** on the cam **40**, while the inner end of the arm merely pivots within the yoke **50**. The torsion spring **52** constantly urges the roller **38** into contact with the cam **40** and prevents the arm **30** from bouncing upwardly an excessive distance during its oscillation.

The oscillating movement of the flyer **15** is effective to prevent tangles and breaks in the wire being taken from the bundles **10—10**, especially when the convolutions of wire in the bundles are not all perfectly concentric. The hank-wound bundles of wire produced on the draw blocks of commercial wire drawing machines usually are not concentric. Depending upon the gage of the wire in the bundle, each bundle may contain from about 5 up to about 25 hanks of wire. The length of wire which connects one hank to another in the bundle may extend from the inside to the outside of the bundle. This condition is known in the trade as "false cross-over." It is an inevitable result of the manner in which the wire is coiled as it emerges from the wire drawing machines. Each time a "false cross-over" is encountered in taking wire from the supply stand, there is a possibility that the adjacent convolution of wire may become fouled and snubbed, and thereby snap taut with such suddenness that the wire may break.

In supply stands embodying the invention, the oscillating movement of the flyer **15** shakes the off-coming convolution as it is unwound from the bundle by alternately increasing and decreasing the tension on the wire to a slight extent at regular intervals. This movement applies additional tension intermittently in a regular series of small jerks, which are sufficient to loosen any snagged convolution of wire before a much larger tension caused by snagging will be applied.

The wire guide **32** on the flyer **15** is designed to retain the wire **24** until the bundle it is being taken from becomes exhausted, and then to allow the wire to slip easily through the slotted portion **80** of the wire guide. In this manner the uncoiling operation is shifted readily from the exhausted arbor to the other arbor, on which a full bundle is waiting to be unwound. The inclination of the diagonally slotted portion **80** is fixed at the proper angle to allow the wire to slip out of the C-shaped portions **78—78** of the guide **32** only when this shift

occurs. The dotted lines on Figure 4 show the position of the wire 24 just prior to its transfer from one arbor to the other.

It is evident that supply stands embodying the invention are not limited to use in paying off steel wire. The invention may be used advantageously in handling filaments, strands or threads composed of other materials, such as linen, cotton, rayon or synthetic plastic yarn, and wires composed of other metals or alloys.

What is claimed is:

1. A supply stand for paying off filaments from coils thereof, which comprises a substantially upright arbor designed to extend axially into and receive such a coil, a substantially horizontal arm having one end mounted rotatably and pivotally on the top of the arbor and having its other end free to be rotated around the arbor by a filament as it is payed off from the coil, a wire guide mounted on the free end of the arm for guiding the filament being payed off from the coil, a circular cam mounted on the top of the arbor, and a cam follower carried by the arm in contact with the cam for oscillating vertically the end of the arm on which the wire guide is mounted during rotation of the arm, thereby preventing tangles from occurring in the filament.

2. A supply stand for paying off filaments from coils thereof, which comprises a substantially upright arbor designed to extend axially into and receive such a coil, a substantially horizontal arm having one end mounted rotatably and pivotally in the center of the top of the arbor and having its other end free to be rotated around the arbor by a filament as it is payed off from the coil, a wire guide mounted on the free end of the arm for guiding the filament being payed off from the coil, a circular cam having a plurality of alternate lobes and dwells mounted on the top of the arbor, and a cam follower carried by the arm and arranged to ride over the lobes and dwells of the cam to oscillate vertically the end of the arm on which the wire guide is mounted during rotation of the arm, thereby preventing tangles from occurring in the filament.

3. A supply stand for paying off wire from coils thereof, which comprises a platform designed to support such a coil, a ring mounted removably on the platform above a coil supported thereon, means mounted rotatably in the center of the ring, a horizontal arm having one end mounted pivotally on the rotatable means and having its other end free to be rotated around the ring by a wire as it is payed off from the coil, a wire guide mounted on the free end of the arm for guiding the wire being payed off from the coil, a circular cam mounted concentrically within the ring, a cam follower carried by the arm and arranged to ride upon the cam during rotation of the arm around the ring, said cam having a plurality of alternate lobes and dwells which cause the arm to oscillate vertically during its rotation thereby preventing tangles from occurring in the wire, and a spring connecting the arm and the first-mentioned means for urging the cam follower into contact with the cam.

4. A supply stand for paying off wire from coils thereof, which comprises a platform having a plurality of slots spaced in a circle near the inner periphery of such a coil supported thereon, a ring having a plurality of prongs designed to pass axially through the coil and extend into the slots in the platform, a horizontal arm having one end mounted pivotally and rotatably in a yoke positioned in the center of the ring and having its other end free to be rotated around the ring by a wire as it is payed off from the coil, a wire guide mounted on the free end of the arm for guiding the wire being payed off from the coil, a circular cam mounted concentrically within the ring, a cam follower carried by the arm and arranged to ride upon the cam during movement of the arm around the ring, said cam having a plurality of alternate lobes and dwells which pivot the arm during its rotational movement to oscillate vertically the wire guide, thereby preventing tangles from occurring in the wire, a torsion spring secured to the arm within the yoke for urging the cam follower into contact with the cam, and means for applying frictional drag to the rotation of the arm to prevent the wire guide from overrunning the convolutions of wire being unwound.

5. A supply stand for paying off wire from coils thereof, which comprises a flat platform having a plurality of slots spaced in a circle near the inner periphery of such a coil supported thereon, an upright arbor mounted removably on the platform and extending axially through the coil supported thereon, said arbor having a hollow ring provided with a plurality of radial spokes and having a plurality of arcuate prongs extending inwardly and downwardly from the ring so as to pass through the slots in the platform and rest against the inner periphery of the coil supported thereon, a yoke mounted on the spokes in the center of the ring, a flyer having its inner end mounted pivotally and rotatably within the yoke and having its outer end free to be rotated around the ring by a wire as it is payed off from the coil, a wire guide secured to the outer end of the flyer for guiding the wire being payed off from the coil, a circular cam mounted on the spokes concentrically with respect to the ring, a cam follower carried by the flyer and arranged to ride upon the cam during rotation of the flyer, said cam having a plurality of alternate lobes and dwells which cause the flyer to oscillate vertically during its rotation, thereby preventing tangles from occurring in the wire, a torsion spring secured to the flyer within the yoke for urging the cam follower into contact with the cam, and means for applying frictional drag to the rotation of the flyer to prevent the wire guide from overrunning the convolutions of wire being unwound.

6. In a supply stand for paying off wire from coils thereof including a pair of upright arbors designed to extend axially into and receive a pair of such coils while a wire is being unwound continuously from them alternately, said arbors being inclined toward each other and aligned with a sheave suspended above and equidistant from the arbors so that the wire may be pulled from either one of the arbors and guided to the sheave, the improvement which comprises a pair of horizontal flyers one for each arbor, each flyer having one end mounted pivotally and rotatably on top of its associated arbor and having the other end free to be rotated around the arbor by a wire as it is payed off from a coil, a pair of circular cams one for each arbor mounted on top of the arbors, a pair of cam followers carried by the flyers and arranged to ride upon the cams during rotation of the flyers, said cams having a plurality of alternate lobes and dwells which oscillate the flyers during their rotation, thereby preventing tangles from occurring in the wire, each of said flyers having mounted on its free end a wire guide comprising a pair of generally C-shaped members positioned in generally horizontal planes one above the other so that the interrupted portion of each C-shaped member faces away from the center of the arbor, and a pair of substantially parallel rods so connecting the C-shaped members as to form a diagonal slot extending from the interrupted portion of one C-shaped member to the interrupted portion of the other C-shaped member, the slot being slanted downwardly opposite to the direction of rotation of said arm as wire is payed off from the coil.

7. A flyer for an over-end pay-off system of uncoiling and paying off wire from a substantially upright supply stand, which comprises an arm having its inner end mounted rotatably on the supply stand and above the coiled wire at an axis of rotation, a wire guide secured to the outer end of said arm, said wire guide comprising a pair of generally C-shaped members positioned in generally horizontal planes one above the other so that the interrupted portion of each C-shaped member faces away

from the axis of rotation of said arm, and a pair of substantially parallel members so connecting the C-shaped members as to form a diagonal slot extending from the interrupted portion of one C-shaped member to the interrupted portion of the other C-shaped member, the slot being slanted downwardly opposite to the direction of rotation of said arm.

8. A flyer for an over-end pay-off system of uncoiling and paying off wires from a substantially upright supply stand, which comprises an arm having an inner end mounted rotatably on the supply stand and above the coiled wire at an axis of rotation, and a wire guide secured to the end of the arm away from the axis of rotation, said wire guide comprising a single endless rod twisted to define the continuous edge of a substantially upright tubular member having a diagonal slot on the side thereof, the slot slanted downwardly opposite to the direction of rotation of said arm and the slot being on the portion of the tubular member which faces outwardly from the axis of rotation.

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