

June 2, 1964

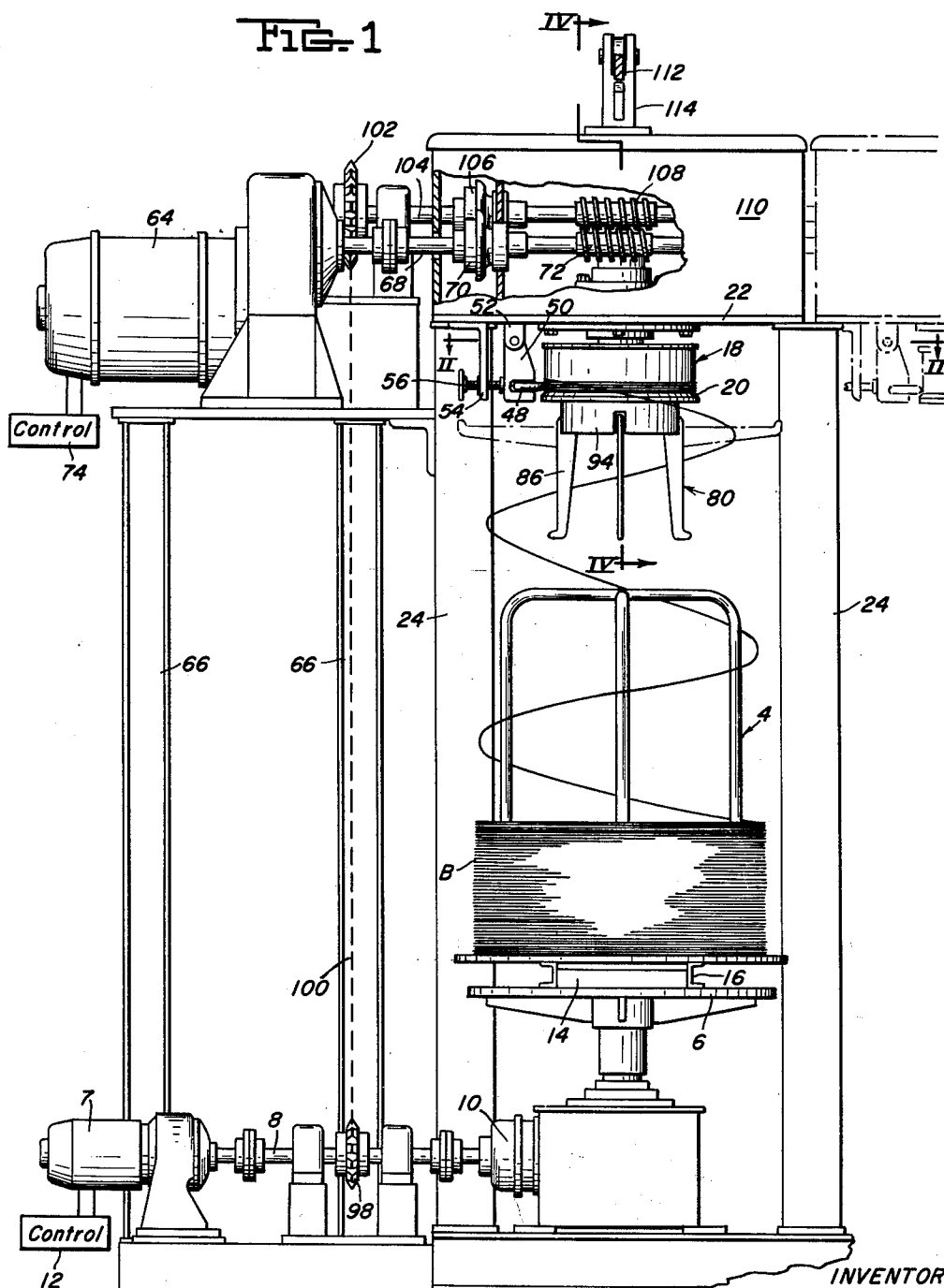
K. A. BROWN

3,135,477

APPARATUS FOR COILING WIRE

Filed Nov. 5, 1959

3 Sheets-Sheet 1



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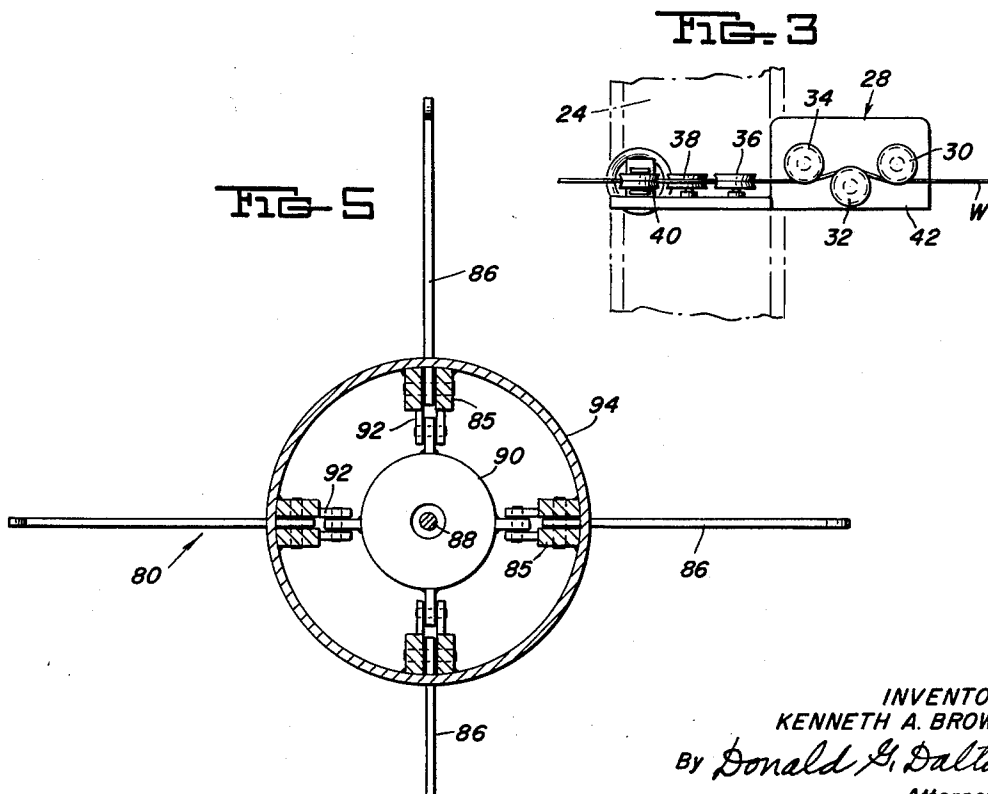
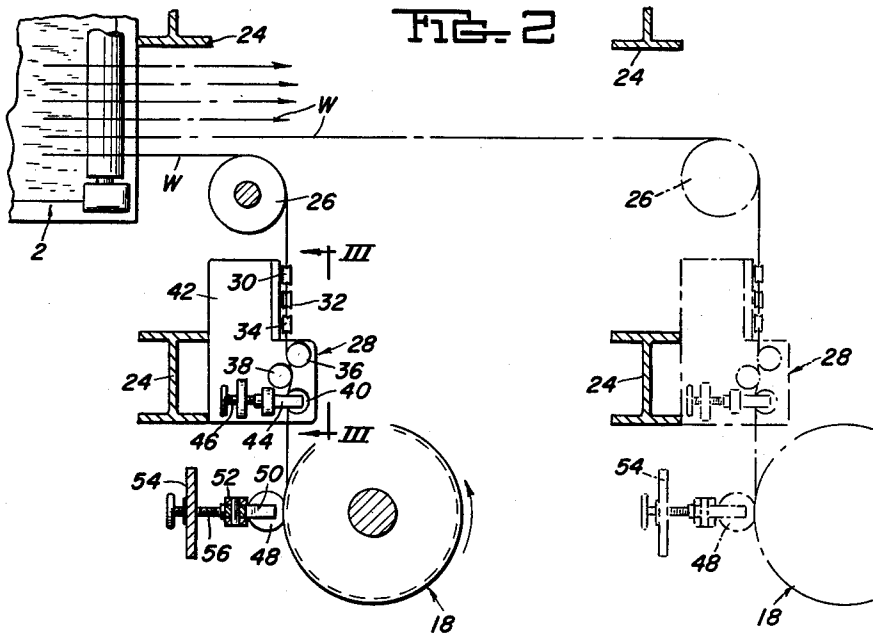
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3 Sheets-Sheet 2



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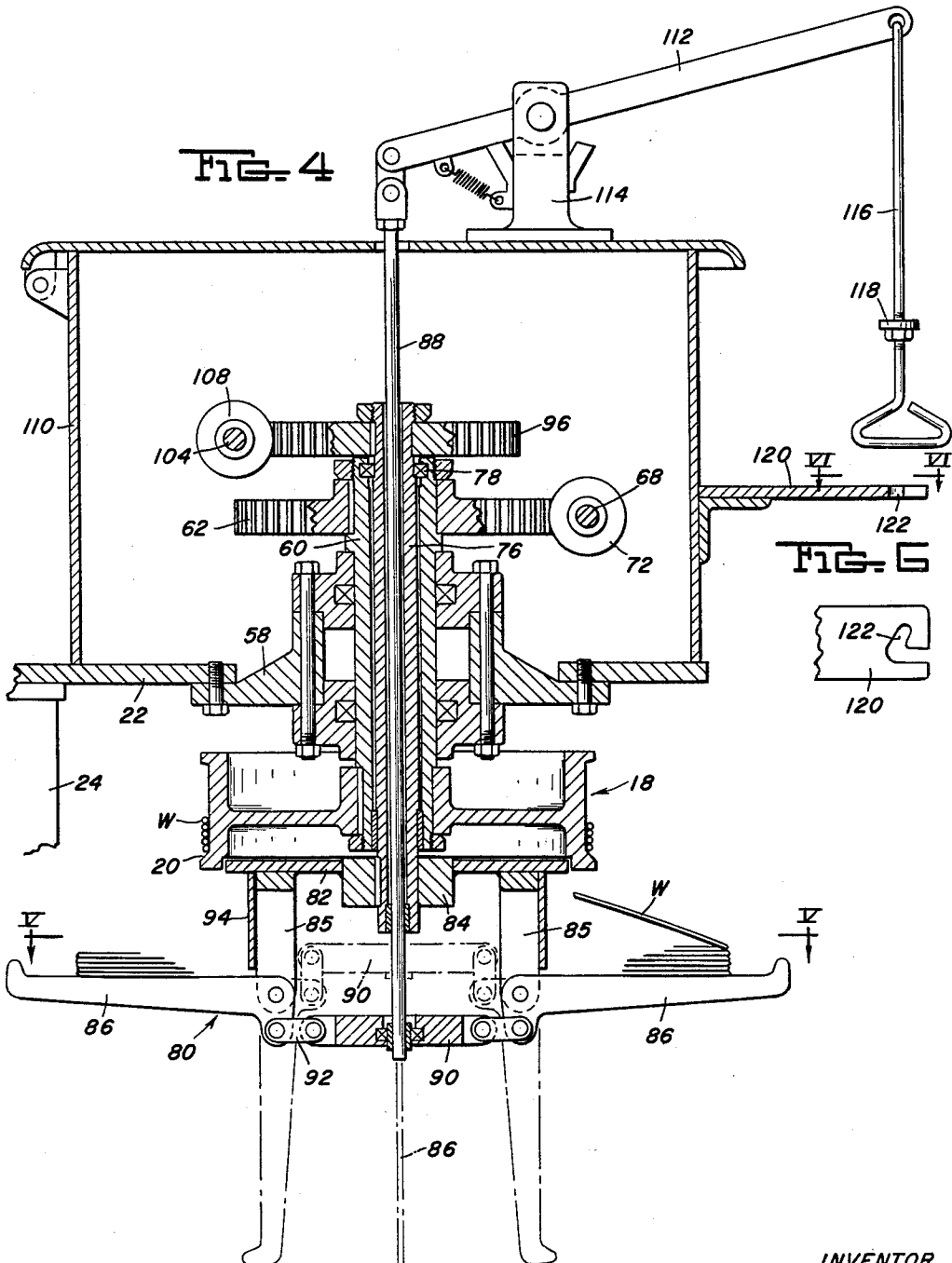
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APPARATUS FOR COILING WIRE

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3 Sheets-Sheet 3



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APPARATUS FOR COILING WIRE

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8 Claims. (Cl. 242—83)

This invention relates to apparatus for coiling wire and more particularly wire coming from continuous processing lines such as electro-galvanizing lines. In most processing equipment it is necessary, or at least desirable, that the wire keep moving through the processing equipment at all times. Since bundles of processed wire must be removed and an empty reel put in place periodically provision must be made for handling the wire while a new reel is being placed in position. Apparatus previously used for this purpose was not completely satisfactory because of the cost of the equipment and/or resulting damage to the wire.

It is therefore an object of my invention to provide inexpensive apparatus for coiling wire which permits the continuous processing of wire while a coil of wire is being removed and a new reel placed in position.

This and other objects will be more apparent after referring to the following specification and attached drawings, in which:

FIGURE 1 is an elevation of my apparatus with parts broken away for the purpose of illustration;

FIGURE 2 is a view taken on the line II—II of FIGURE 1;

FIGURE 3 is an enlarged view taken on the line III—III of FIGURE 2;

FIGURE 4 is an enlarged view taken on the line IV—IV of FIGURE 1;

FIGURE 5 is a view taken on the line V—V of FIGURE 4; and

FIGURE 6 is a view taken on the line VI—VI of FIGURE 4.

Referring more particularly to the drawings reference numeral 2 indicates a galvanizing pot through which passes a plurality of wires W. Each of the wires W passes from the galvanizing pot to a reel 4 mounted on a turntable 6. Only one reel and the equipment associated therewith will be shown and described since the same equipment is used for coiling each of the wires. The turntable 4 is driven from the motor 7 through shaft 8 and electric clutch 10. A control 12 regulates the speed of motor 7. The top of the turntable 6 has a rectangular projection 14 over which fits a socket 16 attached to the bottom of reel 4. A capstan 18 is mounted above the reel 4 in general axial alignment therewith. Capstan 18 has a peripheral flange 20 on its lower end. A plate 22 is supported above the capstan 18 on columns 24. Suspended from the plate 22 is a sheave 26 around which the wire W passes. A casting device 28 is located between the sheave 26 and capstan 18. This casting device, which is a standard piece of equipment, consists of three rolls 30, 32 and 34 mounted on horizontal axes in staggered relationship and three rolls 36, 38 and 40 arranged on vertical axes in staggered relationship. The rolls 30, 32, 34, 36, 38 and 40 are mounted on a bracket 42 attached to the bottom of plate 22 and also to one of the columns 24. The roll 40 is mounted in a bracket 44 which is movable in a horizontal direction by means of screw 46 so as to adjust the position of the roll 40 with respect to the rolls 36 and 38. The purpose of the casting device 28 is to produce a "dead cast" wire having convolutions of the desired diameter. The diameter of the convolutions is determined by the position of roll 40 with respect to rolls 36 and 38. A rubber covered pressure roller 48 is mounted adjacent the capstan 18 in a bracket 50 which

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in turn is pivotally mounted on a support 52 attached to plate 22. An angle bracket 54 is attached to the underside of plate 22 and carries a threaded screw 56 which passes through a correspondingly threaded opening in bracket 54 and bears against bracket 50.

A bracket 58 (FIGURE 4) attached to plate 22 supports a hollow shaft 60 having its axis vertical. The capstan 18 is keyed to the lower end of shaft 60 for rotation therewith and a gear 62 is keyed to the upper end thereof. A gear motor 64 mounted on columns 66 drives the capstan 18 through a shaft 68, electric clutch 70 and 72 worm in mesh with gear 62. Control 74 regulates the speed of motor 64. A hollow shaft 76 is mounted within shaft 60 on bearings 78 and carries wire supporting means 80 at its lower end. The wire supporting means 80 includes a horizontal plate 82 welded to hub 84 attached to the shaft 76, a plurality of downwardly extending brackets 85 attached to the plate 82, and a finger 86 pivotally mounted on each of the brackets 85. A shaft 88 extends downwardly through shaft 76 and has a plate 90 attached to its lower end. Links 92 connect each of the fingers 86 to the member 90. A skirt 94 extends downwardly from the plate 82 and around the periphery thereof on the outside of brackets 85. A gear 96 is keyed to the upper part of shaft 76 and is driven from shaft 8 by means of sprocket 98, chain 100, sprocket 102 mounted on shaft 104, electric clutch 106 and worm gear 108 also mounted on shaft 104. The gearing is preferably enclosed in a box 110 mounted on plate 22 and having oil therein for lubrication purposes. The top of shaft 88 is attached to a lever 112 pivotally mounted on a bracket 114 mounted on the top of box 110. A hand lever 116 is pivotally attached to the outer end of lever 112 and has a collar 118 thereon. A plate 120 secured to box 110 extends horizontally outward from the box 110 and has a curved slot 122 therein for receiving the link 116.

In operation, the wire W coming from the processing equipment 2 passes around sheave 26, through casting device 28 to the capstan 18 about which it is wound four or five times with the first convolution being next to the flange 20 and the rest of the convolutions extending upwardly therefrom with the roller 48 bearing thereagainst to give sufficient snubbing action between the wire and capstan to prevent slippage therebetween and thus create enough pull to draw the wire through the processing line. The lever 116 is placed in its lowest position with the collar 118 bearing against the bottom of plate 120 so as to retract the fingers 86 as shown in full lines in FIGURE 1. The motors 7 and 64 are rotated at predetermined speeds. If the diameter of the wire convolutions is the same as the diameter of capstan 18, the reel and the capstan will be rotated at the same speed. However, when the diameter of the wire convolutions is larger than the diameter of the capstan 18 the reel will rotate slower than the capstan. Assuming that the capstan is 16" in diameter, that the diameter of the convolutions in the wire provided by the casting device 28 is 20" and that the diameter of the reel 4 is 18", a wire bundle B having an inner diameter of 18" and an outer diameter of approximately 22" will be formed. In order to accomplish this the relative speeds of the capstan and turntable are determined from the following equation:

$$\frac{D_c}{D_w} = \frac{S_t}{S_c}$$

where D_c =diameter of the capstan in inches, D_w =diameter of the wire convolution (in inches) formed in the casting device; S_t =the r.p.m. of the turntable and S_c =r.p.m. of the capstan. Thus, in the situation set forth above the angular velocity of the turntable must be 80% of the angular velocity of the capstan. The angular velocity of the wire supporting means 80 must be the same

as that of the turntable. As the capstan draws the wire through the processing line the upper convolution above roller 43 will drop by gravity onto reel 4. When the desired amount of wire has been coiled on the reel 4 the wire is cut and the lever 116 is released, thus causing the fingers 86 to move to their outer position. The convolutions of wire are then supported on the fingers 86 while the reel 4 with the bundle of wire mounted thereon is removed and an empty reel replaced on the turntable. During removal and replacing of the reels movement of the turntable is stopped by releasing the electric clutch 10. After the empty reel is in place the clutch 10 is engaged and the fingers retracted, dropping the convolutions on the empty reel. In case the wire convolution is smaller in diameter than the capstan 18 the turntable 6 will rotate faster than the capstan. The skirt 94 limits the minimum size of wire convolutions that can be formed and placed on the reel.

While one embodiment of my invention has been shown and described, it will be apparent that other adaptations and modifications may be made without departing from the scope of the following claims.

I claim:

1. Apparatus for coiling wire comprising a capstan arranged with its axis substantially vertical and around which the wire is wrapped, a rotatable reel beneath said capstan for receiving coils of wire from said capstan, a casting device for controlling the diameter of the coils of wire leaving said capstan, means for rotating said capstan to pull said wire through said casting device, means for rotating said reel at a predetermined speed ratio with respect to said capstan, the rotating means for said capstan including a hollow shaft extending upwardly from said capstan, a hollow shaft within said first named hollow shaft extending from both ends thereof, means for supporting said second hollow shaft for rotation within said first named hollow shaft, wire supporting means connected to the lower end of said second hollow shaft, said wire supporting means including fingers movable from wire supporting position to a retracted position, and means connected to said second hollow shaft for rotating said wire supporting means at substantially the same angular velocity as said reel.

2. Apparatus for coiling wire comprising a capstan arranged with its axis substantially vertical and around which the wire is wrapped, a rotatable reel beneath said capstan for receiving coils of wire from said capstan, a casting device for controlling the diameter of the coils of wire leaving said capstan, means for rotating said capstan to pull said wire through said casting device, means for rotating said reel at a predetermined speed ratio with respect to said capstan, the rotating means for said capstan including a hollow shaft extending upwardly from said capstan, a hollow shaft within said first named hollow shaft extending from both ends thereof, means for supporting said second hollow shaft for rotation within said first named hollow shaft, wire supporting means connected to the lower end of said second hollow shaft, said wire supporting means including a horizontal plate, a plurality of brackets fastened to and extending downwardly from said plate, a finger pivotally mounted on each bracket for movement in a vertical plane from an inner position to a generally horizontal wire receiving position, a shaft extending downwardly within said second hollow shaft and linkage extending between said last named shaft and said fingers, and means connected to said second hollow shaft for rotating said wire supporting means at substantially the same angular velocity as said reel.

3. Apparatus for coiling wire comprising a capstan arranged with its axis substantially vertical and around which the wire is wrapped, a rotatable reel beneath said capstan for receiving coils of wire from said capstan, a casting device for controlling the diameter of the coils of wire leaving said capstan, means for rotating said capstan to pull said wire through said casting device, means for

rotating said reel at a predetermined speed ratio with respect to said capstan, the rotating means for said capstan including a hollow shaft extending upwardly from said capstan, a hollow shaft within said first named hollow shaft extending from both ends thereof, means for supporting said second hollow shaft for rotation within said first named hollow shaft, wire supporting means connected to the lower end of said second hollow shaft, said wire supporting means including a horizontal plate, a plurality of brackets fastened to and extending downwardly from said plate, a finger pivotally mounted on each bracket for movement in a vertical plane from an inner position to a generally horizontal wire receiving position, a shaft extending downwardly within said second hollow shaft, linkage extending between said last named shaft and said fingers and a skirt extending downwardly from said plate on the outside of said brackets at a radial distance less than the radius of said capstan, and means connected to said second hollow shaft for rotating said wire supporting means at substantially the same angular velocity as said reel.

4. Apparatus for continuously processing wire comprising processing equipment, a capstan arranged on the exit side of said processing equipment and around which the wire is wrapped, said capstan being arranged with its axis substantially vertical, a rotatable reel beneath said capstan for receiving coils of wire from said capstan, a casting device between said processing equipment and capstan for controlling the diameter of the coils of wire leaving said capstan, means for rotating said capstan to pull said wire from said processing equipment through said casting device, means for rotating said reel at a predetermined speed ratio with respect to said capstan, the rotating means for said capstan including a hollow shaft extending upwardly from said capstan, a hollow shaft within said first named hollow shaft extending from both ends thereof, means for supporting said second hollow shaft for rotation within said first named hollow shaft, wire supporting means connected to the lower end of said second hollow shaft, said wire supporting means including fingers movable from wire supporting position to a retracted position, and means connected to said second hollow shaft for rotating said wire supporting means at substantially the same angular velocity as said reel.

5. Apparatus for continuously processing wire comprising processing equipment, a capstan arranged on the exit side of said processing equipment and around which the wire is wrapped, said capstan being arranged with its axis substantially vertical, a rotatable reel beneath said capstan for receiving coils of wire from said capstan, a casting device between said processing equipment and capstan for controlling the diameter of the coils of wire leaving said capstan, means for rotating said capstan to pull said wire from said processing equipment through said casting device, means for rotating said reel at a predetermined speed ratio with respect to said capstan, the rotating means for said capstan including a hollow shaft extending upwardly from said capstan, a hollow shaft within said first named hollow shaft extending from both ends thereof, means for supporting said second hollow shaft for rotation within said first named hollow shaft, wire supporting means connected to the lower end of said second hollow shaft, said wire supporting means including a horizontal plate, a plurality of brackets fastened to and extending downwardly from said plate, a finger pivotally mounted on each bracket for movement in a vertical plane from an inner position to a generally horizontal wire receiving position, a shaft extending downwardly within said second hollow shaft and linkage extending between said last named shaft and said fingers, and means connected to said second hollow shaft for rotating said wire supporting means at substantially the same angular velocity as said reel.

6. Apparatus for continuously processing wire comprising processing equipment, a capstan arranged on the exit

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side of said processing equipment around which the wire is wrapped, said capstan being arranged with its axis substantially vertical, a rotatable reel beneath said capstan for receiving coils of wire from said capstan, a casting device between said processing equipment and capstan for controlling the diameter of the coils of wire leaving said capstan, means for rotating said capstan to pull said wire from said processing equipment through said casting device, means for rotating said reel at a predetermined speed ratio with respect to said capstan, the rotating means for said capstan including a hollow shaft extending upwardly from said capstan, a hollow shaft within said first named hollow shaft extending from both ends thereof, means for supporting said second hollow shaft for rotation within said first named hollow shaft, wire supporting means connected to the lower part of said second hollow shaft, said wire supporting means including a horizontal plate, a plurality of brackets fastened to and extending downwardly from said plate, a finger pivotally mounted on each bracket for movement in a vertical plane from an inner position to a generally horizontal wire receiving position, a shaft extending downwardly within said second hollow shaft, linkage extending between said last named shaft and said fingers and a skirt extending downwardly from said plate on the outside of said brackets at a radial distance less than the radius of said capstan, and means connected to said second hollow shaft for rotating said wire supporting means at substantially the same angular velocity as said reel.

7. Apparatus for coiling wire comprising a capstan arranged with its axis substantially vertical and around which the wire is wrapped, a rotatable reel beneath said capstan for receiving coils of wire from said capstan, a casting device for controlling the diameter of the coils of wire leaving said capstan, means for rotating said capstan to pull said wire through said casting device, means for rotating said reel at a predetermined variable speed ratio with respect to said capstan, the rotating means for said capstan including a hollow shaft extending upwardly from said capstan and connected thereto for rotation therewith, a shaft within said hollow shaft, means for supporting said

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last named shaft for rotation within said hollow shaft, wire supporting means connected to the lower end of said last named shaft, means for moving said wire supporting means from wire supporting position to a retracted position, and means connected to said last named shaft for rotating said wire supporting means at substantially the same angular velocity as said reel.

8. Apparatus for continuously processing wire comprising processing equipment, a capstan arranged on the exit side of said processing equipment and around which the wire is wrapped, said capstan being arranged with its axis substantially vertical, a rotatable reel beneath said capstan for receiving coils of wire from said capstan, a casting device between said processing equipment and capstan for controlling the diameter of the coils of wire leaving said capstan, means for rotating said capstan to pull said wire from said processing equipment through said casting device, means for rotating said reel at a predetermined variable speed ratio with respect to said capstan, the rotating means for said capstan including a hollow shaft extending upwardly from said capstan and connected thereto for rotation therewith, a shaft within said hollow shaft, means for supporting said last named shaft for rotation within said hollow shaft, wire supporting means connected to the lower end of said last named shaft, means for moving said wire supporting means from wire supporting position to a retracted position, and means connected to said last named shaft for rotating said wire supporting means at substantially the same angular velocity as said reel.

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