March 29, 1960 H. P. NEPTUNE 2,930,268

WIRE FEEDING AND CUTTING MACHINE WITH FEED EFFECTIVELY STOPPED BY ROLLING BACK ON WIRE

Filed July 6, 1954 5 Sheets-Sheet 1

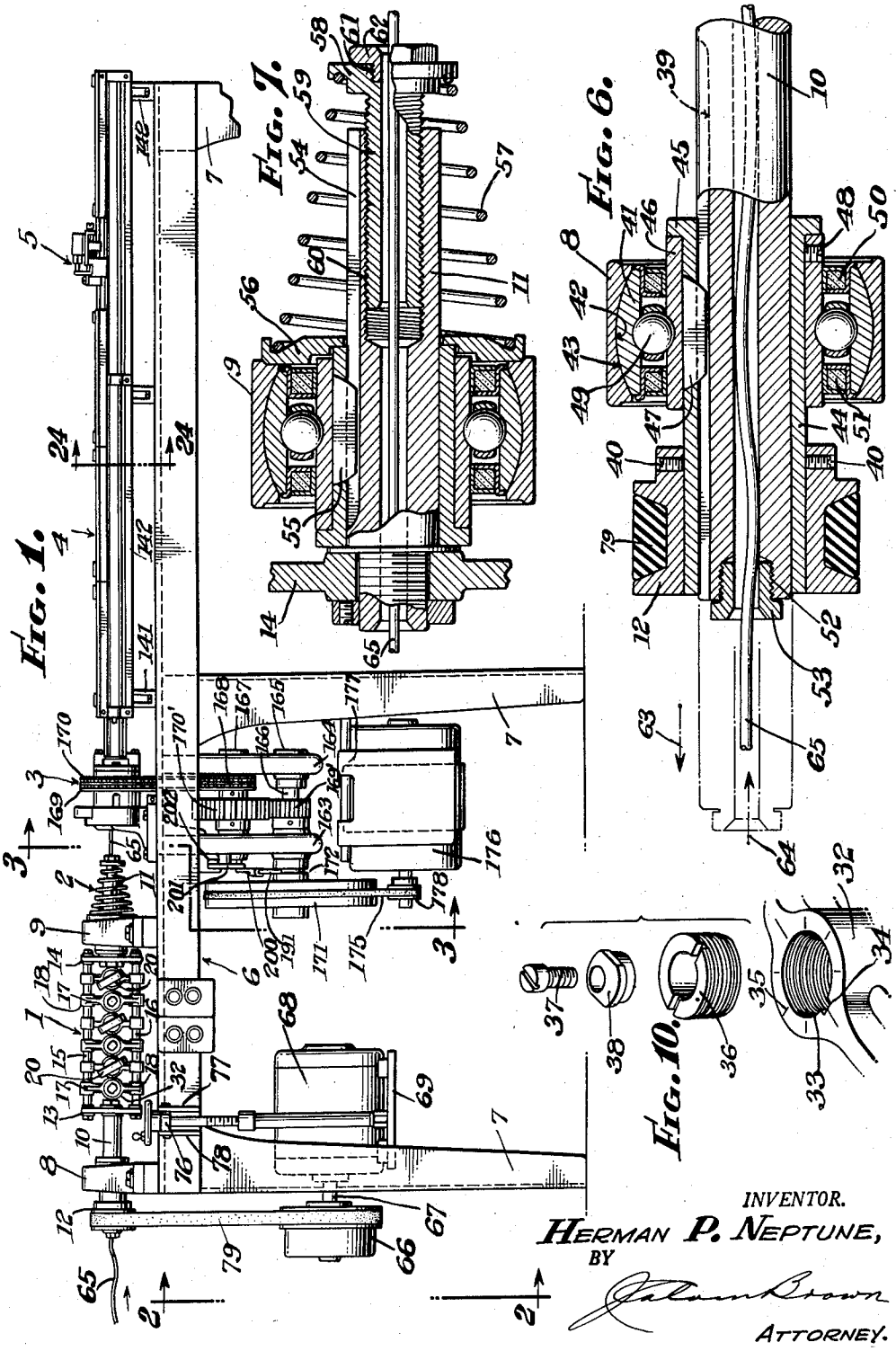


FIG. 1.

FIG. 7.

FIG. 6.

FIG. 10.

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WIRE FEEDING AND CUTTING MACHINE WITH FEED EFFECTIVELY STOPPED BY ROLLING BACK ON WIRE

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FIG. 2.

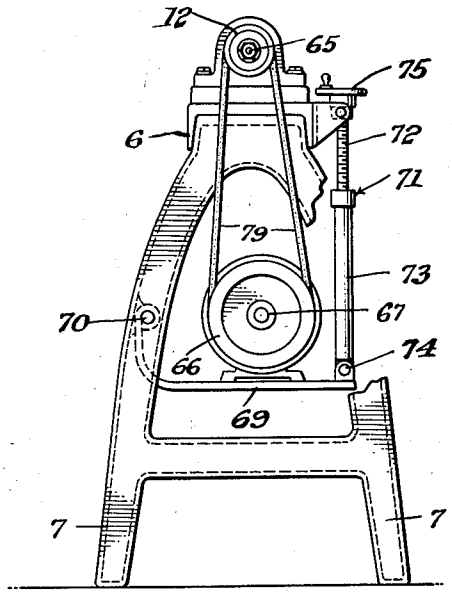


FIG. 3.

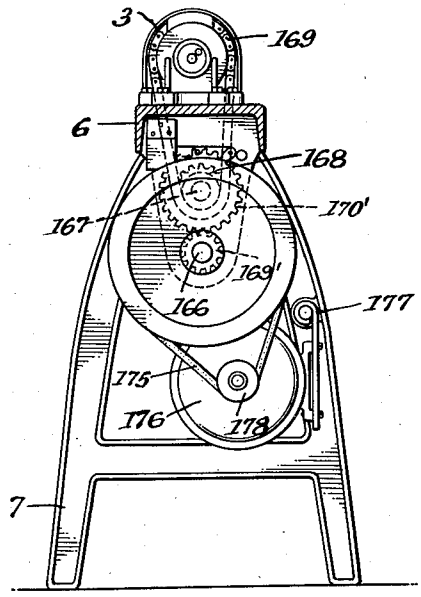
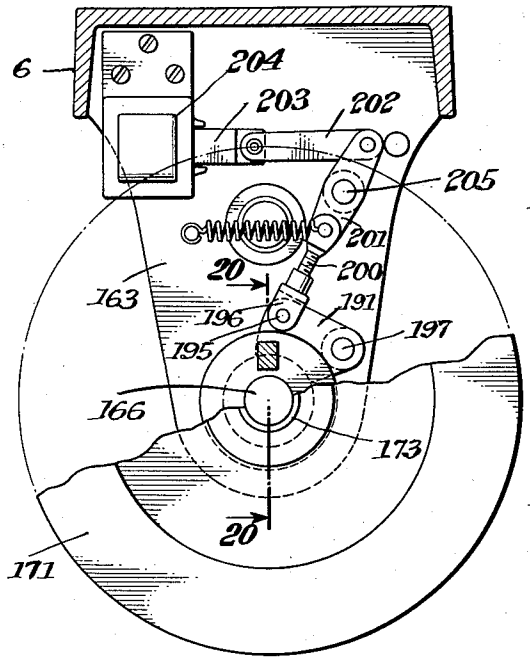
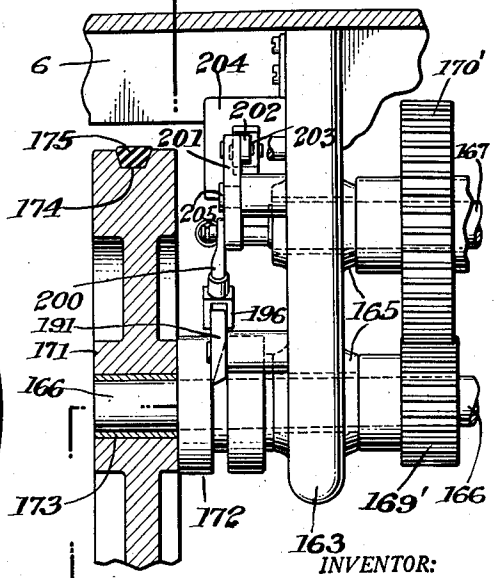


FIG. 18.



18 → FIG. 19.



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WIRE FEEDING AND CUTTING MACHINE WITH FEED EFFECTIVELY STOPPED BY ROLLING BACK ON WIRE

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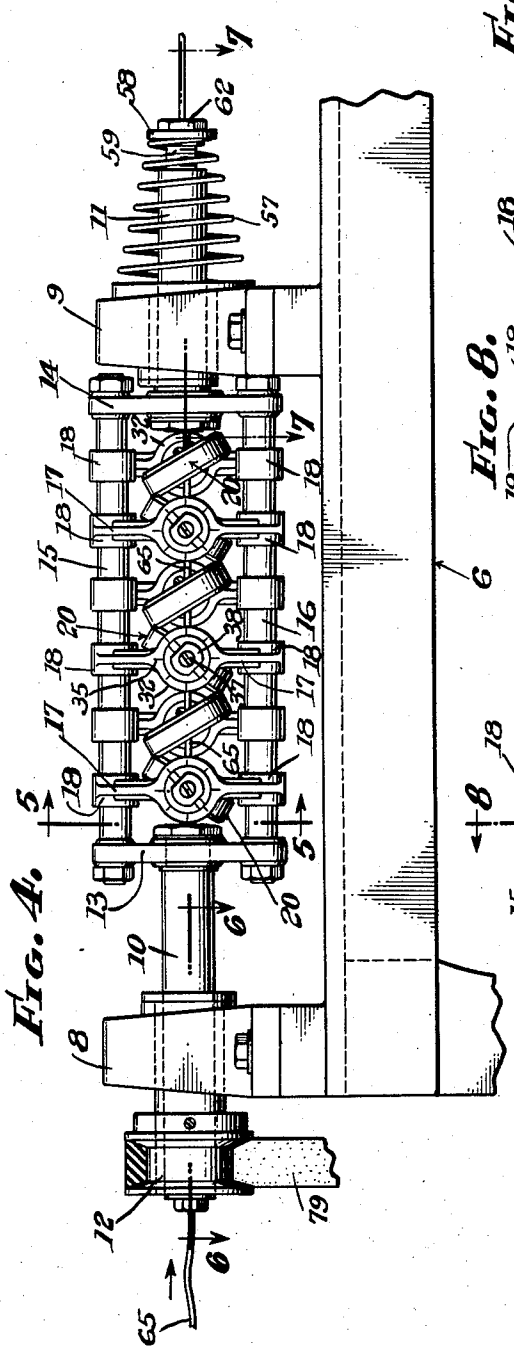


FIG. 4.

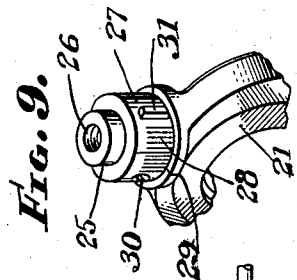


FIG. 9.

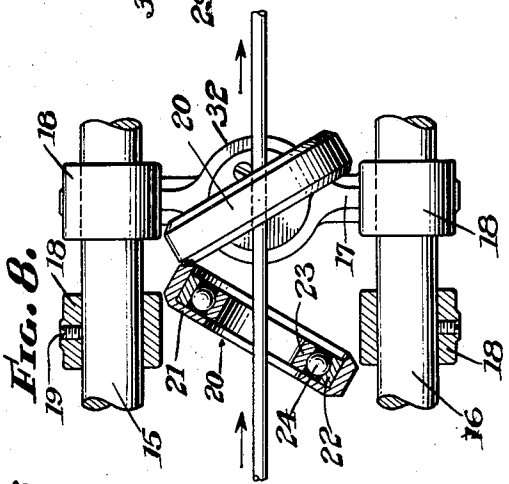


FIG. 8.

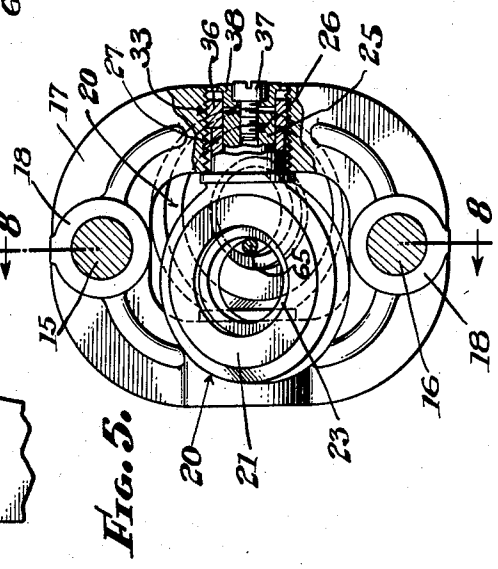


FIG. 5.

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WIRE FEEDING AND CUTTING MACHINE WITH FEED EFFECTIVELY STOPPED BY ROLLING BACK ON WIRE

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FIG. 11.

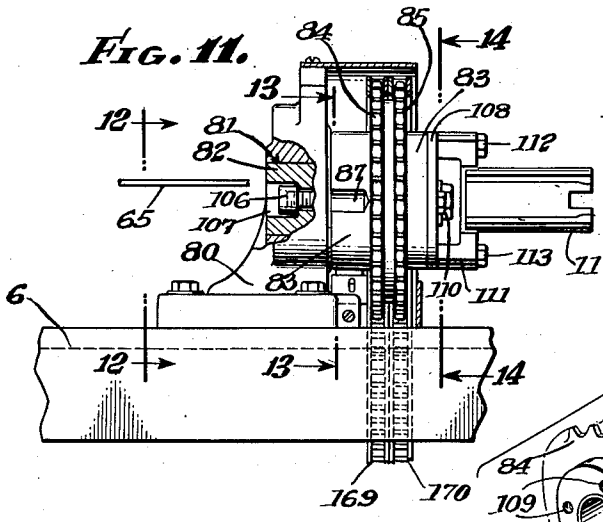
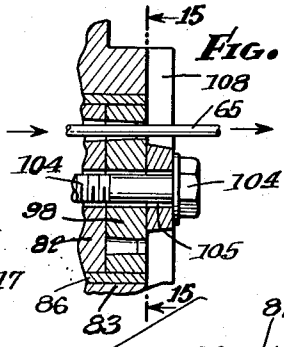


FIG. 16.



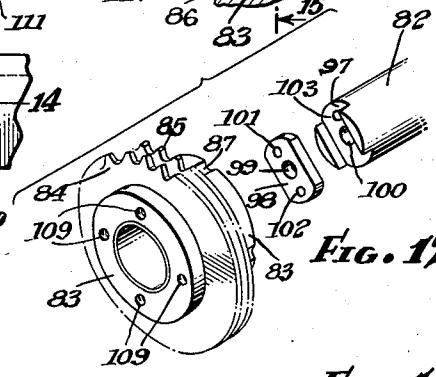


FIG. 17.

FIG. 12.

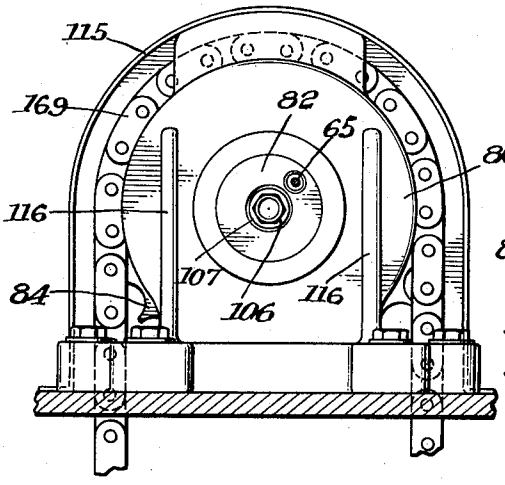


FIG. 13.

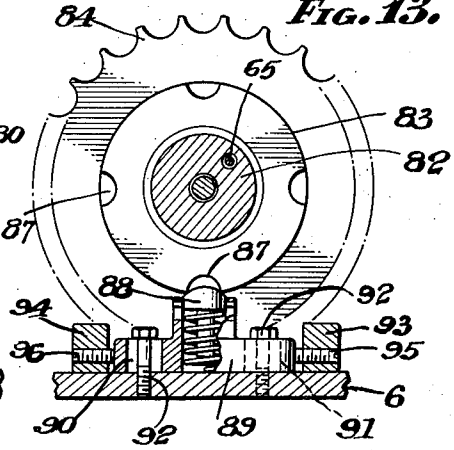


FIG. 14.

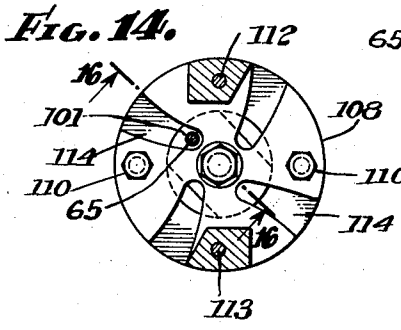
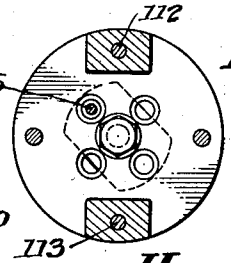


FIG. 15.



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WIRE FEEDING AND CUTTING MACHINE WITH FEED EFFECTIVELY STOPPED BY ROLLING BACK ON WIRE

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FIG. 20.

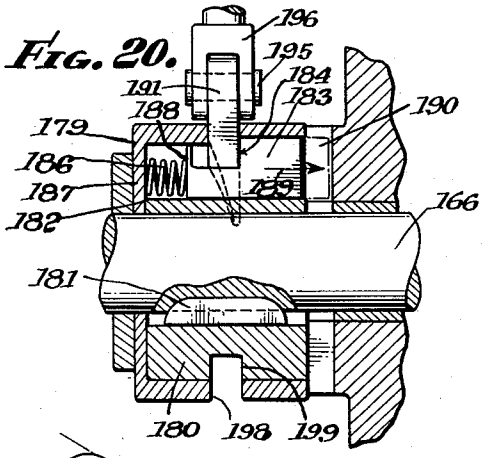


FIG. 21.

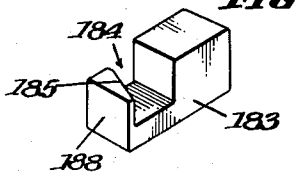


FIG. 22.

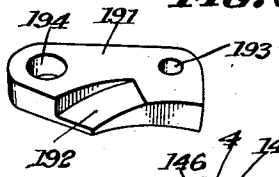


FIG. 23.

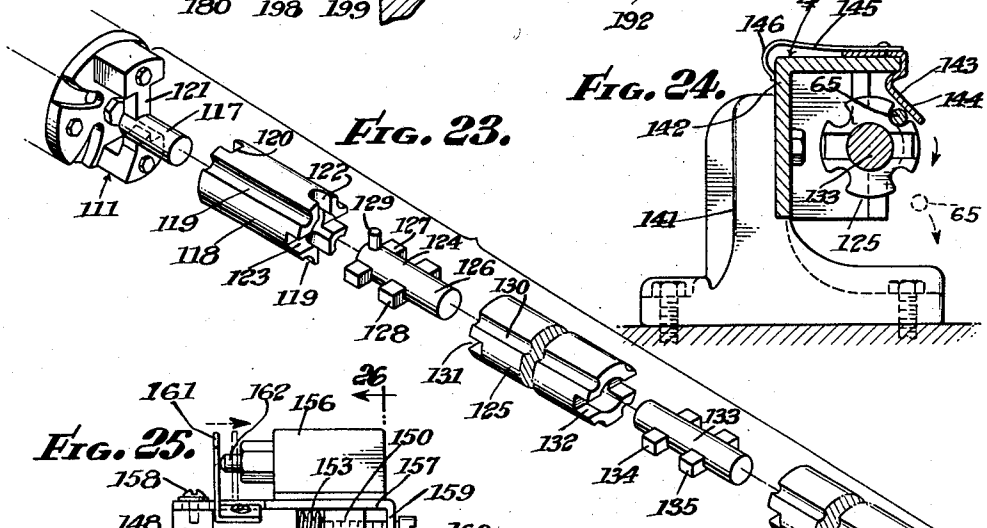


FIG. 24.

FIG. 25.

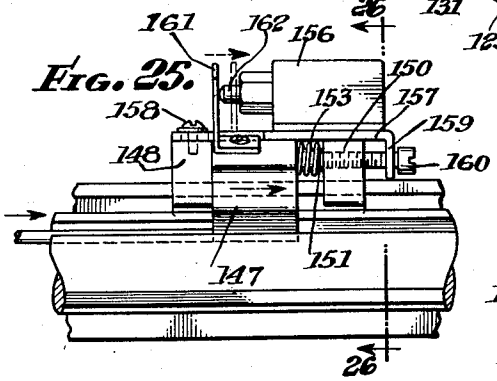


FIG. 26.

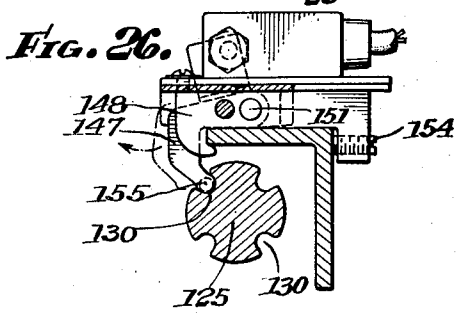
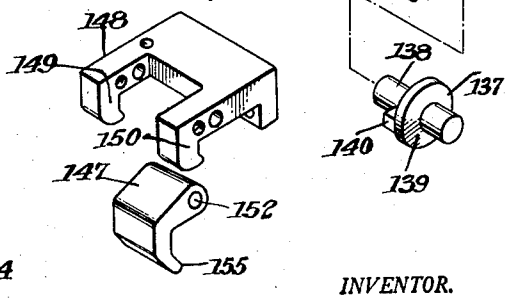


FIG. 27.



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United States Patent Office 2,930,268 Patented Mar. 29, 1960

2,930,268

WIRE FEEDING AND CUTTING MACHINE WITH FEED EFFECTIVELY STOPPED BY ROLLING BACK ON WIRE

Herman P. Neptune, Los Angeles, Calif.

Application July 6, 1954, Serial No. 441,361

2 Claims. (Cl. 83—80)

The present invention relates to a wire straightening and cutting machine of the type which will quickly and efficiently straighten wire of different gauges, followed by severing the wire into desired lengths.

An object of the invention is the provision of a machine of the character stated, wherein the end of a coil of wire may be fed directly into the machine without having to stop the machine or make an adjustment of any of the parts. This is an important object because the wire straightening and cutting machines with which the inventor is familiar require stopping the machine, backing off certain parts so the wire will pass through the straightening head, threading the wire into the machine by hand, re-adjusting the parts that have been moved, and then starting the machine. This wastes time and wire because the first piece of wire that is threaded through the machine by hand is never straight and must be discarded.

The average straightening and cutting machine has a series of opposed friction shoes (usually made of cast iron) which are adjustably mounted, in a staggered position, in a spinning barrel, or head. The wire is straightened by forcibly pulling it through these spinning shoes by means of friction feed rolls. The present invention eliminates the feed rolls and the wire is fed through the machine by the angularity of bearings which roll around the surface of the wire in a spiral contact. This requires only about one-third the horsepower necessary for the other type of machine.

A further object is the provision of a machine wherein the wire to be straightened and severed may be moved in two directions, that is, into the machine or reversed and directed out of the machine.

A further object is the provision of a machine for straightening and cutting wire, wherein all wires cut are of identical length and the cut is substantially at right angles to the axis of the wire, in other words, a square cut.

A further object is the provision of a wire straightening and cutting machine which drops the cut length of wire from the machine without danger of it remaining in the machine.

A further object is the provision of a wire straightening and cutting machine which operates automatically, efficient in operation, which may be preset so as to cut a given number of wires and then automatically stop, and which is generally superior to wire straightening and cutting machines now known to the inventor.

With the above mentioned and other objects in view, the invention consists in the novel and useful provision, formation, construction, association, and relative arrangement of parts, members and features, all as shown in certain embodiments in the accompanying drawings, described generally and more particularly pointed out in the claims.

In the drawings:

Figure 1 is a fragmentary side elevation of the complete machine,

Figure 2 is an elevation of the machine shown in

Figure 1 looking in the direction of the arrows 2—2 of said figure,

Figure 3 is a sectional view on the line 3—3 of Figure 1,

Figure 4 is an enlarged fragmentary side elevation, partly in section, of the means for straightening wire,

Figure 5 is an enlarged partially sectional view on the line 5—5 of Figure 4,

Figure 6 is an enlarged sectional view on the line 6—6 of Figure 4,

Figure 7 is an cnlarged fragmentary sectional view on the line 7—7 of Figure 4,

Figure 8 is a fragmentary view, partly in section on the line 8—8 of Figure 5,

Figure 9 is a fragmentary perspective view of one of the means utilized for straightening wire,

Figure 10 is a separated view of certain portions of one of the means for straightening wire,

Figure 11 is a fragmentary, partially sectional elevation of the wire cut-off head assembly,

Figure 12 is a fragmentary, partially sectional view, on the line 12—12 of Figure 11,

Figure 13 is a fragmentary, partially sectional view, on the line 13—13 of Figure 11,

Figure 14 is a sectional view on the line 14—14 of Figure 11,

Figure 15 is a sectional view on the line 15—15 of Figure 16,

Figure 16 is a sectional view on the line 16—16 of Figure 14,

Figure 17 is a separated perspective view of a portion of the wire cut-off head assembly and unloading bar,

Figure 18 is a fragmentary sectional view on the line 18—18 of Figure 19, and illustrating means for operating a fly wheel clutch for operating the cut-off head assembly and for rotating the unloading bar,

Figure 19 is a fragmentary, partially sectional view substantially at right angles to the showing of Figure 18,

Figure 20 is a fragmentary sectional view on the line 20—20 of Figure 18, and on an enlarged scale from said latter figure,

Figure 21 is a perspective view of a dog used in the clutch assembly,

Figure 22 is a perspective view of a wedge which cooperates with the dog of Figure 21 in the clutch assembly,

Figure 23 is a separated view of the unloading bar and a portion of the cut-off head assembly.

Figure 24 is a sectional view, on an enlarged scale, on the line 24—24 of Figure 1,

Figure 25 is a fragmentary view on an enlarged scale and partly in section, of a micro-switch adapted to operate the cut-off head assembly during that portion indicated by the arrow 25 of Figure 1,

Figure 26 is a fragmentary sectional view on the line 26—26 of Figure 25, and

Figure 27 is a perspective view of the means utilized in controlling the micro-switch resultant upon a given length of wire being fed to the unloading bar.

Referring now to the drawings, and specifically to Figure 1, I provide at 1, a wire straightener and feeding assembly. 2 is a take-up assembly which operates in conjunction with the wire straightener and feeding assembly. At 3, I provide a cut-off head assembly. 4 indicates an unloading bar assembly for the severed wire, and 5 is a micro-switch and stop assembly which, when actuated, operates a clutch, which clutch, when engaged, rotates the unloading bar a certain degree of revolution, and the cut-off head assembly to sever the wire. Each of these assemblies will be described in detail.

Primarily, the complete machine includes a suitable framing 6 mounted on a plurality of legs 7 and upon the

top member of said framing are provided spaced bearing blocks 8 and 9 for the wire straightening and feeding assembly 1. I provide a pair of tubular shafts 10 and 11 for mounting the wire straightening and feeding assembly. Referring to Figure 4, shaft 10 extends through the bearing block 8, the outer end thereof carrying a pulley 12, while the inner end of said shaft is secured to a cross-arm or head 13. Shaft 11 is passed through bearing block 9 and the inner end thereof carries a cross-head 14 identical to the cross head 13. Secured between the cross heads are a pair of rods 15 and 16, the rods being secured to the cross heads in any appropriate manner. Secured between the rods 15 and 16 are a plurality of spaced yokes 17, the said yokes, in each instance, being U-shaped, with each end thereof provided with a boss 18 for mounting on the rods 15 and 16. These bosses are held on their respective rods in a defined position by any appropriate means, such as by set screws 19 (Figure 8). It will be observed that the yokes 17 are arranged in staggered sequence, which is to say, the convex side faces outwardly in each instance. Each yoke 17 is adapted to carry substantially centrally of its concavity, means 20 which functions to both straighten and feed the wire when the yokes are bodily rotated. The means 20 includes an annular casing 21 which houses outer and inner races 22 and 23, respectively, between which races are bearing balls 24.

Each annular casing or housing 21 is provided with an external radial stud 25, which is axially boxed and threaded at 26. Adapted to surround the stud for a portion of its length is a sleeve 27 provided with external vertical graduations 28. The annular casing 21 is provided with an index graduation at 29, and the sleeve may be turned relative to said graduation 29 and then locked in position by means of a set screw 30. The sleeve 27 is provided with a vertical key 31.

Each yoke 17 is provided with an enlargement intermediate the bosses 18, as shown at 32. This enlargement is provided with a threaded bore 33. There is a vertical keyway at 34, in said enlargement, and the outer surface of the enlargement is provided with graduations 35. It is intended that the key 31 should be received within the keyway 34. The position of the graduations 28 relative to the index graduation 29 will, of course, determine the angularity assumed by the annular casing 21 when the sleeve 27 has its key 31 received in the keyway 34, assuming that the set screw 30 has locked the sleeve to the stud 25. In addition to being able to adjust the angularity of the annular casing 21, adjustment is provided axially of the enlargement 32. As shown in Figures 5, 9 and 10, an annular nut 36 engages the internal threads 33 and bear against the top of the sleeve 27 to move the sleeve and the stud inwardly or outwardly of the threaded bore 33. Such adjustment is maintained by providing a screw 37 passed through a flanged spacer sleeve 38, the threads of the screw engaging the threads 26. The spacer sleeve 38 does not contact the end of the stud 25 and this permits the flange thereof to lock the adjusting nut 36. This assembly is shown in Figure 5, in section. Such inward and outward adjustment of the means for feeding and straightening the wire allows the machine to be used with different gauge wire with the said means 20 alternately canted in opposite directions, as best shown in Figure 4, which may be considered a positive cant, a negative cant, and so on. Such a canting angle functions as a friction screw for feeding the wire through the wire straightening and feeding assembly 1, while the inward or outward adjustment of the means 20 acts to straighten the wire during feeding movement thereof.

Referring to Figure 6, and specifically the bearing block 8, the tubular shaft 10 is provided with a longitudinal keyway 39. The pulley 12 is secured to a sleeve 44 in any appropriate manner, such as by set screws 40, while the arrangement for the bearing block 8 is such as to allow for axial movement of the shaft 10. A form of self-aligning race is utilized, in that the annular race 41 has a curved outer surface 42 which engages an inner curved bearing surface 43 of the bearing block. The sleeve 44 surrounds shaft 10 and has a flanged end 45. Upon this sleeve and bearing against the flange 45 is a race 46, and depending from the race and passed through a slot in the sleeve 44 and into the keyway 39, is a key 47. Race 46 is in locked engagement with the sleeve 44 by means of a set screw 48. Interposed between the races are ball bearings 49, and on opposite sides of the ball bearings and likewise interposed between the races are packing means 50 and 51. In the present instance, the ball bearings are partially encased, as shown. The outer end of shaft 10 is provided with an enlarged threaded axial bore 52 to receive an annular guide nut 53 for the wire to be straightened.

The shaft 11 is similar in construction to the shaft 10, in that it is provided with a longitudinal keyway 54 adapted to receive a key 55 associated with a self-aligning type of race constructed the same as the self-aligning race just described for the shaft 10, and for this reason, the particular construction will not be described in detail, save and except that a spring collet 56 bears against the bearing assembly, there being a conical type coil spring 57 having its base end engaging the spring collet while its smallest diameter end engages head 58 on the end of elongated annular threaded shank 59. This shank is received within an enlarged threaded bore 60 of the shaft 11, the head of said shank being provided with an internal threaded bore at 61 to receive a flanged guide nut 62 for the wire. In the construction shown, it will be evident that the shaft assembly may move to compress the spring, the spring normally urging the shaft to move in one direction. This portion, as previously stated, is known as the take-up assembly. When the spring is compressed, the wire straightening and feeding assembly moves in the direction of the arrow 63 of Figure 6. This will occur when translational movement of the wire in passing through the wire straightening and feeding assembly is suddenly stopped during wire cutting, with the result that the means 20 will travel upon the wire, and in so doing, move the shafts 10 and 11 in the direction of the arrow 63 to compress the spring 57. However, when movement is again permitted the wire, in the direction of the arrow 64 of Figure 6, the spring 57 expands and the wire is again fed through the machine. All of this operation will be detailed later.

For the purpose of driving the assembly 1 to feed wire such as 65 thereto, I provide a variable speed pulley 66 mounted on shaft 67 of motor 68. Motor 68 is mounted on a platform 69, which platform is hinged at one end 70 (Figure 2), to the legs of the framing while the opposite or free end of the platform may be moved upwardly or downwardly by the means shown at 71. This means comprises an elongated screw 72 threaded within tube 73, the lower end of which tube is hinged at 74 to the platform. The upper end of the screw 72 carries a wheel 75 and the upper end of said screw is supported by means of a collar 76 (Figure 1), pinned between a pair of lugs 77 and 78 projecting from the frame 6. A continuous belt 79 is passed between pulley 12 and the variable speed pulley 66. As variable speed pulleys are common in the art, the present pulley 66 will not be detailed as to construction. Needless to say, swinging the motor platform up or down will cause a variation in the speed of the belt 79.

The cut-off head assembly indicated at 3 in Figure 1, is detailed in Figures 11 to 17, inclusive. When a predetermined selected length of wire has been fed by the assembly 1 and movement of the wire has been stopped momentarily, the cut-off head assembly comes into operation to sever the wire to a given length prior to feeding more wire. This cut-off head assembly includes a bracket 80 secured to the framing 6, which bracket is pro-

vided with a bore 81. The bore 81 receives a shaft 82, and the shaft in turn supports a hub 83 provided with sprockets 84 and 85. The hub is adapted to rotate on the shaft, the shaft being stationary. However, in actual practice, a bushing 86 is interposed between the shaft 82 and the hub 83. The hub, at one side of sprocket 84, is provided with equidistantly spaced notches 87. A spring-pressed pawl 88, mounted in a shiftable block 89 on the framing 6, is adapted to engage the notches progressively during operation of the cut-off head assembly. Referring to Figure 13, the block 89 is provided with enlarged bores at 90 and 91, through which bores are passed small bolts 92, received in threaded bores in the framing. Small posts which are part of the cut-off head casting are arranged on either side of the block 89 at 93 and 94 and adjusting screws 95 and 96 are passed through said posts for engagement with sides of the block. In this manner, the block may be moved to different locations on the framing, whereby the pawl will be properly received within a notch 87 upon a given revolution of the hub 83. One end of the shaft 82 is diametrically grooved at 97 to receive and confine a cutter 98 which conforms to the outline of the groove. This cutter is provided with a bore at 99, which registers with the axial bore 100 in shaft 82. The cutter is provided with bores 101 and 102 which are of different diameter to allow for cutting different gauge wire, and the shaft 82 is provided with a bore 103 through which wire is adapted to be passed. It is intended that the cutter 98 should be stationary, as is likewise the shaft 82, and assemblage of the cutter with the shaft is provided by an elongated bolt 104. Head of bolt 104 bears against the outer face of the cutter 108, the shank of the bolt being passed through bores 99, 100 and 105 of the cutters 108, 98, of shaft 82 with a nut 106 received within a counterbore 107 of the shaft to engage the bolt threads and hold the bolt against movement. Upon reference to Figure 16, it will be observed that the bores 101 and 102 of the cutter are tapered, the smallest diameter end facing outwardly of the cutter. The bore 103 of the shaft may be tapered, as shown in the same figure.

It is to be observed that the outer surface of the cutter 98 is flush with the end surface of the hub 83. A rotary cutter 108 is positioned in flush face engagement with the outer face of cutter 98. The hub is provided with four equidistantly spaced, threaded bores 109 (see Figure 17), and the cutter 108 is secured to the end of said hub by means of diametrically positioned bolts 110, received in diametrically positioned screw-threaded bores 109. A yoke 111 diametrically spans the cutter and is secured to the hub by a pair of bolts 112 and 113, which are passed through bores in the cutter 108 for reception in the other two diametric threaded bores 109 of the hub (see Figure 14). The cutter 108 is of disc form and provided with slots 114. In the present instance, there are four slots, all equidistantly spaced apart, which extend from the periphery of said cutter inwardly toward the center thereof with each slot of tapered form. The walls bounding each slot diverge outwardly toward the cutter periphery, with the walls of each slot slightly arcuate in form. It is the intent that the pawl 88 should engage a notch 87 so that one of the slots 114 is in alignment with bore 101 of cutter 98 during each quarter revolution of cutter blade 108. Thus, Figure 14 shows the bore 101 so positioned relative to a slot 114 that wire may be passed therethrough, and severed when the cutter 108 is rotated. This, of course, is a shear cut. As shown in the figures, I may complete the device and add to its appearance by providing a cover 115 overlying the sprockets and secured to the bracket 80. As shown in Figure 12, the bracket is braced with ribs 116.

The unloading bar assembly 4 for the wire is shown in detached perspective in Figure 23, and various cooperating members in Figures 24, 26 and 27. The unloading bar assembly is made up of sections, the number of sections depending upon the length of the wire to be severed. Projecting from the intermediate portion of the yoke 111 is an axial stud 117, which is adapted to be received within an axial bore of section 118 of the unloading bar assembly, which section has a curved surface provided with four equidistantly spaced apart, longitudinal grooves 119. One end of section 118 is diametrically grooved, at 120, to receive and confine the intermediate portion 121 of yoke 111. The opposite end of the section 118 is provided with two diametric 90° crossed grooves, as shown at 122 and 123. A connector 124 is provided between section 118 and a further axially aligned section 125. The connector comprises a cylindrical stud 126, provided with spaced pairs of diametrically positioned, parallel lugs 127 and 128 and top and bottom pins 129 in diametric relationship. This connector is adapted to have the pins 129 received within the end grooves 122 while the diametric lugs 127 are received within the diametric grooves 123 of section 118. The section 125 is axially bored and provided with four longitudinally extending grooves 130, which are equidistantly spaced apart to be in alignment with the grooves 119 of section 118, and said section 125 is diametrically grooved at one end, as shown at 131. The stud 126 enters bore of section 125 and the lugs 128 are received within the groove 131. The opposite end of section 125 is diametrically grooved at 132 to receive a further connector 133 provided with spaced diametric lugs or wings 134 and 135, a portion of the connector being received in the axial bore of section 125, with the wings or lugs 134 received within the groove 132. A further section is provided at 136, identical in construction with the section 125. Thus, any number of sections of the type shown at 125 and 136 may be joined together, with connectors of the type shown at 133, depending, as before stated, upon the length of the wire to be severed. An end piece is provided for the last section at 137, which consists of a cylindrical bar 138 provided with a flange 139 and a pair of diametric lugs or wings 140, the lugs adapted to enter the diametric groove on the end of the last section of the unloading bar assembly.

Suitable split bearing blocks carried by the spaced brackets 141 (see Figure 24) support the several connectors 124, 133, etc., intermediate the lugs or wings thereof, with an end bearing block for stud 138, so that the entire bar assembly is held in cooperative relationship for intermittent rotation. The brackets 141 carry a support bar 142 which overlies the different sections of the unloading bar assembly. As shown in Figure 24, the support bar is adapted to carry a guard 143, which has a part 144 closely adjacent to the periphery of a section (118, 125, 136), for the purpose of maintaining a straight uncut length of wire within one of the grooves of the unloading bar assembly and from under said guard, the severed wire escapes when the unloading bar assembly is rotated a quarter revolution, as indicated in said Figure 24. As shown in Figure 24, the support bar has two legs in substantially right angular relationship, and the guard is adapted to engage one of said legs and be held thereto by means of a spring 145 having a curved end 146 which engages the other leg of the member.

In order to assure proper sequential quarter-turn revolutions of the unloading bar assembly, the means detailed in Figures 26 and 27 is provided. This means includes members 147 and 148, the member 147 constituting a stop, while the member 148 is a carrying member for the said stop. Member 148 is provided with a pair of hook-type prongs 149 and 150, between which prongs is a pin 151 and the said stop is transversely bored at 152 for reception of said pin. The stop member is of lesser width than the spacing between the prongs and ordinarily the stop member is urged against one of the prongs by means of a coil spring 153 which surrounds the pin 151 and bears against a side of the stop member.

As best shown in Figure 26, the member **148** is so formed as to overlie and straddle one leg of the support bar **142**, being held to said support bar by means of set screws **154**. As shown, the hook ends of member **148** engage an edge of one of the legs of the support bar. The stop member has a part **155** adapted to enter one of the longitudinal grooves of a section of the unloading bar assembly. The stop member drops by gravity. However, the stop portion **155** will leave a groove when the unloading bar assembly is rotated, and enter the next following groove.

I have provided a micro type switch **156**, suitably mounted on a bar **157**, which bar is secured in any appropriate manner, such as the means **158**, to the member **148** and which bar has an angular end **159**. Passed through said angular end and through a screw-threaded bore in prong **150** is an adjusting screw **160** for limiting movement of the stop member **147** in one direction. Carried by stop member **147** is a bracket **161** adapted to engage a plunger type switch arm **162** of the micro switch. Thus, when the wire is fed within a groove of the unloading bar assembly, the outermost end of said wire will contact the stop **147** and move the same to compress the spring **153** and bring the bracket **161** into contact with the switch arm **162** to close the switch. When this occurs, the clutch is engaged so as to rotate, for a quarter of a revolution, the cut-off head assembly and the unloading bar assembly.

The clutch assembly is detailed in Figures 1, 3, 18 and 19, and reference is now made to said figures. Depending from the framing **6** are a pair of support members **163** and **164** having the form or outline shown best in Figure 18. These support members are provided with bearings designated generally as **165**, for a drive and a driven shaft **166** and **167**. The driven shaft **167** carries a pair of sprockets **168**, over which sprockets and the sprockets shown at **84** and **85**, Figure 17, are passed continuous chains **169** and **170**. As shown in Figure 3, the sprockets are of different size and are in a 1-to-2 relationship; in other words, one complete revolution of the sprockets **168** produces a half revolution of sprockets **84** and **85**. Carried by the shafts **166** and **167** are gears **169'** and **170'**, which gears intermesh in a ratio of 1-to-2, which is to say, every complete revolution of gear **169'** produces a half a revolution in the gear **170'**. As shown in Figure 1, these gears are positioned intermediate the support means **163** and **164**. Shaft **166** extends beyond the support member **163** and carries a fly wheel **171** and clutch **172**. The fly wheel **171** is bushed, at **173**, and is free to rotate on the shaft **166** until engaged by the clutch **172** to produce shaft rotation. The said fly wheel is provided with a circumferential groove **174** to receive a belt **175**, which belt is adapted to be driven by a motor **176**. The motor is conventional and is provided with a swing mount **177** (see Figure 3), with the motor shaft carrying a pulley **178** over which the belt **175** is passed (see Figures 1 and 3). The clutch, in the present instance, is of the type employed in punch presses, although other types of clutches may be employed. The present clutch (see Figure 20) includes a clutch box **179** which encloses a collar **180** which surrounds shaft **166** and keyed thereto at **181**. The collar is provided with a transverse groove **182**. Within the groove **182** is a key or dog **183** of the construction shown in Figure 21.

The dog is grooved at **184** and provided with a cam face at **185**. There is a coil spring **186** included between the closed end **187** of the box **179** and the face **188** of the key or dog. Normally, the spring **186** urges the dog in the direction of the arrow **189** of Figure 20, and in so doing, causes the dog to enter a pocket or recess **190** in the outer face of the hub of the fly wheel **171**. To control movement of the dog and its fly wheel engagement, a wedge **191** is provided of the type shown in Figure 22. This wedge has a cam portion at **192**, and is provided with a pair of transverse bores **193** and **194**. A pin **195** is passed through bore **193** and secures the wedge to clevis **196**. The wedge is fastened by a pin **197** passed through bore **194** to the support **163** (see Figure 18). The said wedge is positioned within the annular grooves **198** and **199** in the box and the collar, respectively. An adjustable link **200** secures the clevis **196** to one end of a lever **201**, the opposite end of said lever being secured to a link **202**, which link is fastened to plunger **203** of solenoid **204**. The lever **201** is intermediately pivoted at **205** to the support member **163**. Preliminarily, when the arm **162** closes the micro switch, the solenoid **204** is energized to pull the plunger **203** inwardly and rock the wedge about its pivot, lifting the same from the groove **184** of the key or dog to permit the dog to be moved by the spring **186**, whereby the dog is received within the pocket or recess **190** of the fly wheel, thus communicating rotation to shaft **166**. However, the wedge immediately drops back within the annular grooves **198** and **199** so that the cam edge **192** will engage the cam face **185** of the dog and release the dog from the pocket or recess **190**, whereupon the fly wheel continues to rotate freely upon the shaft **166** and without producing any shaft rotation. It is evident that when the shaft **166** is rotated that the gear **169'** will rotate the gear **170'** and that the relationship is such that two revolutions of gear **169'** produces a single revolution of gear **170'**. The driven shaft **167** will rotate the sprocket **168** which, in turn, through the medium of the chain drive, will rotate the sprockets **169** and **170**. The relationship between sprockets **168**, **169** and **170** is 2-to-1; in other words, two complete revolutions of sprockets **168** produce but a single revolution of the sprockets **169** and **170**, with the result that the cut-off head assembly and the unloading bar assembly rotates one-quarter revolution for each complete revolution of the fly wheel. Any other relationship might be resorted to, depending upon the construction of the cut-off head assembly and the number of grooves **130** in the various sections of the unloading bar.

The operation, use, and advantage of the invention just described are as follows:

The wire **65** may be fed from a roll of wire and, as shown in Figure 1, is passed through the hollow stud shaft for reception between the members which provide for both wire straightening and feeding. It will be noted from Figure 8 that successive means **20** of the wire straightening and feeding device are successively canted or inclined relative to each other, whereby when the shafts **10** and **11** are rotated, it will produce rotation of the said means **1**, the wire will be caused to thread its way through the said means **1**. In so threading, the adjustment is such that the wire is straightened regardless of how badly bent it may be upon entering the hollow shaft **10**. An example as to how the means **1** functions is well illustrated in Figure 5, which shows the wire in section being passed between two of the means **20**. The degree of angularity assumed by the means **20**, as well as the relative spacing on alternate sides of said means is all accomplished by the mechanism illustrated and described so as to accommodate different gauge wire. As the wire is fed through and beyond the stud shaft **11**, the wire passes through the cut-off head assembly **3** and into one of the grooves of the aligned sections of the unloading bar. The end of the wire will finally contact the bracket **161** and move it from the full line position of Figure 25, to the dotted line position, which will cause the switch arm **162** to move and close the switch. When this occurs, the solenoid **204** is energized to move the plunger **203** within the coil and in so doing, the wedge **191** is lifted from its engagement within the groove **184** of the key or dog **183** to permit said dog, under actuation of spring **186**, to move in the direction of the arrows **189** in Figure 20, and be received in the pocket or recess **190** of the fly wheel. The fly wheel is being driven contin-

uously by the motor **176** and when the gear dog enters the pocket or recess thereof, the collar **180** will be rotated one turn, as will likewise be rotated, the gear **169**. Rotation of the gear **169** will rotate gear **170** a half turn, and the sprocket relationship between the cut-off head assembly and the sprockets carried by the shaft **167** are such that the cut-off head assembly is rotated a quarter turn, as is likewise rotated the unloading bar a quarter turn. The wedge **191**, after actuation of the solenoid, immediately drops back into the annular groove in the box **179** and collar **180** and the cam edge portion **192** of such wedge will engage the cam edge **185** of the key or dog and move the same outwardly from the dog or recess **190** of the fly wheel. Also, to insure proper alignment of the unloading bar, and its rotation, the stop **147** lifts from one groove and drops into the following groove. When the unloading bar rotates after a cutting operation of a wire, the wire drops by gravity, as shown by the arrows in Figure 24, and assures that the cut wire is removed from the unloading bar. The cutter of the cut off head, and specifically the cutter **108**, has four equidistantly spaced-apart slots **114**, and the wire to be cut is fed through one or the other of the openings **101** and **102** of the reversible cutter **98**. The relative position between the rotary cutter and the fixed cutter is such that the wire to be cut is received within one of the slots **114**, as best shown in Figure 14, at **101**. A shear cut results on the wire, and it has been found, in actual practice, that the wire is cut cleanly and without flattening the wire. Also, the machine is capable of producing substantially exact lengths of cut wire.

As pointed out in the statement of the objects of the invention, the present invention allows wire to be fed within the machine or to have the wire straightening and feeding assembly reversed as to rotation, to withdraw the wire, a feature of importance under actual operating conditions.

Sections may be added to the unloading bar assembly, as needed. If the cutter **108** requires replacement, the bolts **112** and **113** are removed to release the yoke **111**, whereupon section **118** of the unloading bar assembly **4** may be turned on pins **129** of connector **124**. The cutter **108** is then released by removal of bolts **110** and nut **106**. In this manner, the remaining sections and connectors of the unloading bar assembly are not disturbed.

I claim:

1. A machine of the character disclosed: having means for feeding in one direction a length of wire, including cutter means through which a length of wire is passed, an elongated bar provided with a groove for receiving the wire passed through the cutter means, a switch obstructing the groove of said elongated bar and adapted to be engaged and closed by the wire, means actuated upon a closing of the switch to operate the cutter means to sever the wire and to rotate the elongated bar to unload the wire from the groove, said means for feeding the wire provided with resilient take-up means whereby when the wire closes the switch, movement of the wire is stopped and said means for feeding the wire rotates upon and travels in a direction opposite to the direction of wire feed upon the wire to compress the resilient take-up means.

2. A machine of the character disclosed: having a wire feeding means, a cut-off head assembly for the wire, and an unloading bar assembly for receiving a length of the wire; means for continuously rotating the wire feeding means to move the wire through said means past the cut-off head assembly and onto the unloading bar assembly, means for intermittently rotating the cut-off head assembly and the unloading bar assembly, an electric switch to be contacted by the leading end of the wire when a given length thereof is received on the unloading bar assembly to close an electric circuit to means to actuate the cut-off assembly to sever the wire and to rotate the unloading bar assembly to discharge the severed wire, said wire upon contacting the said switch stopping feeding movement thereof through the wire feeding means, resilient take-up means provided for the means for feeding the wire whereby when the wire closes the switch, feed movement of the wire being stopped, the said means for feeding the wire rotates upon and travels in a direction opposite to the feeding direction of the wire to compress the take-up means, the resilient take-up means expanding when the wire again travels forwardly through the wire feed means toward the electric switch.

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