

March 4, 1958

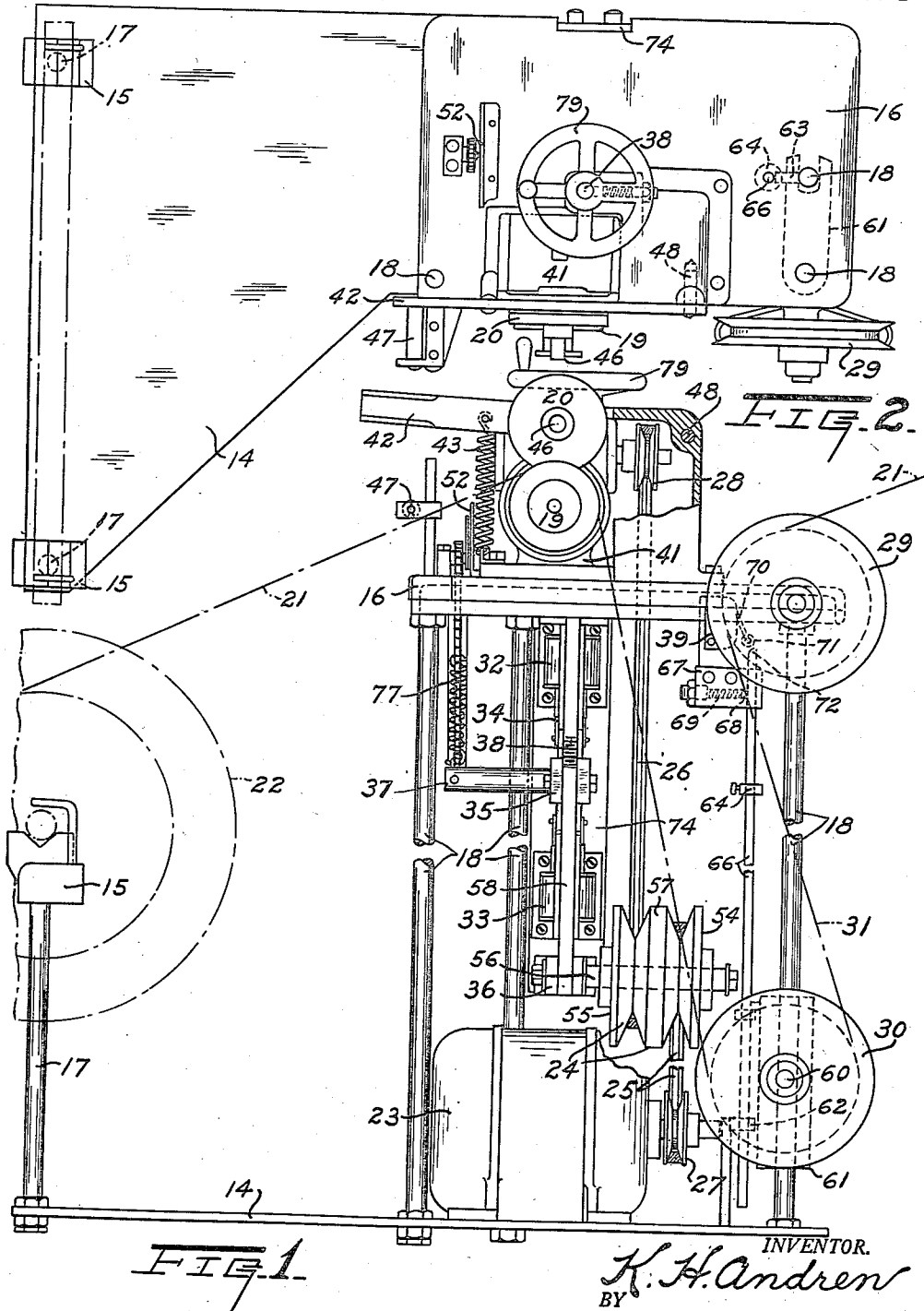
K. H. ANDREN

2,825,512

WIRE FEEDER

Filed Oct. 19, 1953

3 Sheets-Sheet 1



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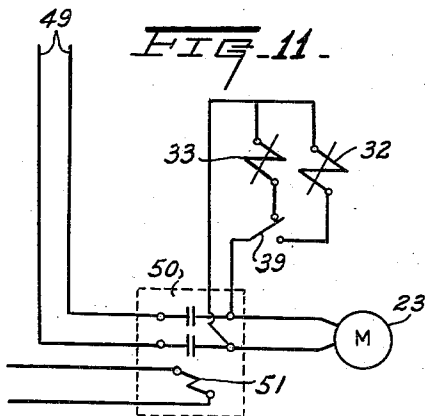
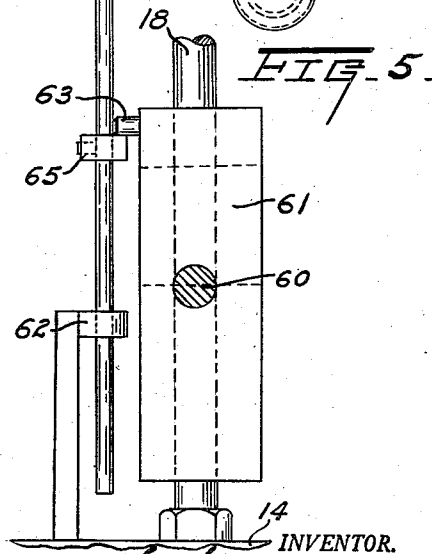
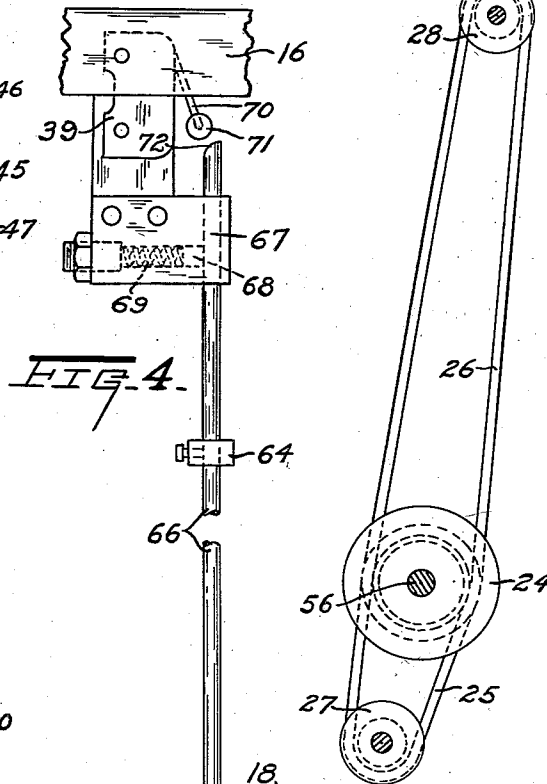
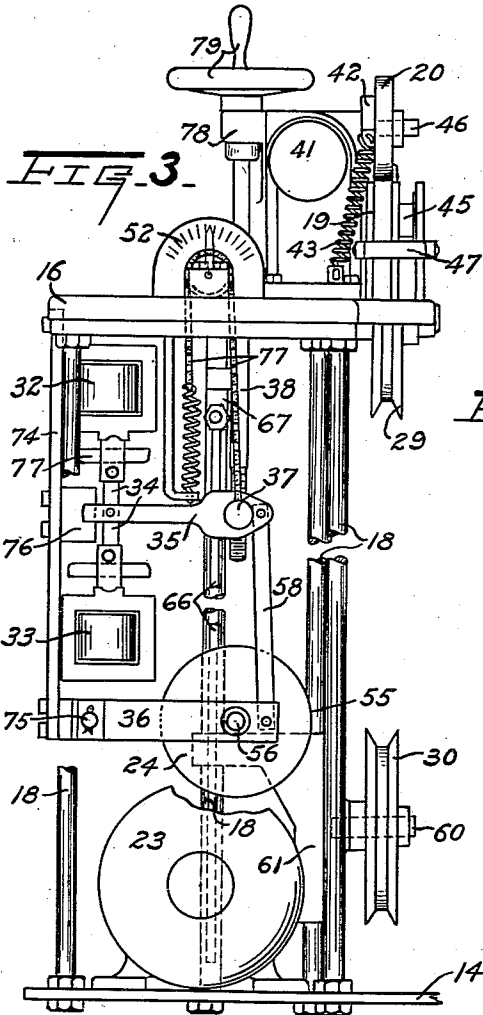
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WIRE FEEDER

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3 Sheets-Sheet 2



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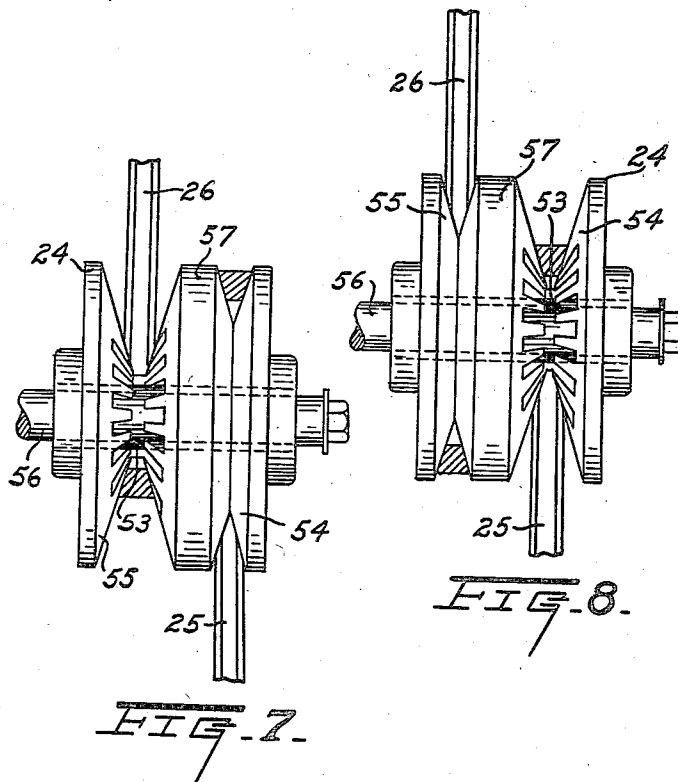
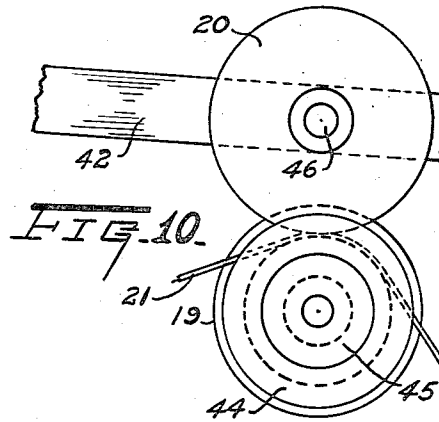
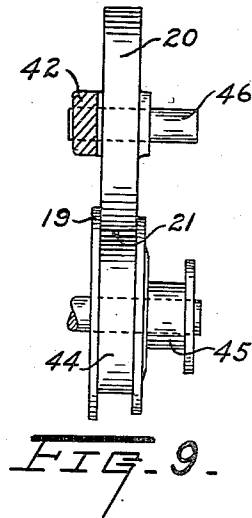
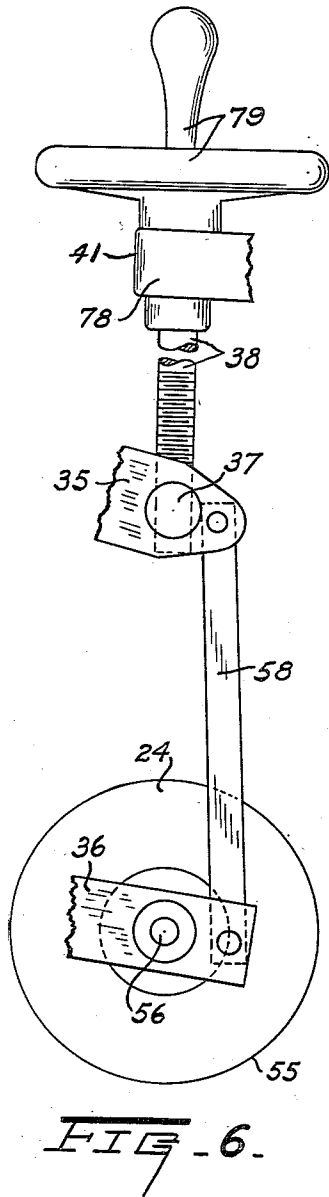
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WIRE FEEDER

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3 Sheets-Sheet 3



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2,825,512

WIRE FEEDER

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Application October 19, 1953, Serial No. 386,984

3 Claims. (Cl. 242—45)

The present invention relates generally to improvements in the art of longitudinally paying out elongated stock from a supply source to a place of utilization of the material, and relates more specifically to improvements in the construction and operation of automatically functioning mechanism for accurately feeding wire or the like from a supply reel to a machine such as a cutting and/or stripping machine for the wire stock.

The primary object of my invention is to provide an improved feeder for wire stock or other elongated material which is simple but durable in construction and readily adjustable and operable to automatically and effectively feed the stock from supply to demand sources with utmost precision.

When operating machines for cutting, stripping, marking or otherwise sub-dividing continuous insulated wire withdrawn from a supply reel, into successive lengths for diverse uses, it is usually desirable to perform the operations in rapid succession and with extreme accuracy. In order to enable such performance to be accomplished the wire stock should preferably be fed to these machines at a constant predetermined rate and in successive lengths substantially corresponding to those of the final sections desired and under approximately uniform tension. Since both the weight and the diameter of the wire supply reels varies to a great extent as the operation of the stock utilizing machine continues, and the demand for wire by these machines may also be varied, it is necessary to provide some kind of prefeeding mechanism for withdrawing the stock from the reel and for delivering it as required to the cutting, stripping or marking zone, and while some attempts have heretofore been made to provide such mechanism none of these prior devices have been entirely satisfactory especially when used in conjunction with heavy and loosely wound wire supply coils or reels; since they have failed to meet one or more of the requirements.

It is therefore an important object of this invention to provide an improved wire prefeeder which functions automatically to meet all of the above mentioned requirements with extreme accuracy, and which may also be readily adjusted to comply with varying conditions of operation.

Another important object of the present invention is to provide an improved power driven prefeeding unit for wire stock or the like, which will effectively cooperate with variable supply and demand sources to insure proper delivery of the material to the source of utilization under varying operating conditions.

A further important object of the invention is to provide a compact wire feeding mechanism which is adapted to constantly withdraw wire from a coil or heavy reel and to pay out predetermined lengths of the wire at varying speeds, and which may be adjusted to vary the successive lengths of stock while the mechanism is operating or at rest.

Still another important object of my invention is to provide a simple mechanical unit adapted to be elec-

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trically operated and controlled to cooperate with a wire cutting and stripping machine in accordance with the functioning and requirements of such a machine.

These and other more specific objects and advantages of the invention will be apparent from the following detailed description from which it will be observed that the gist of the improvement is the provision of a wire feeder having a rotor for withdrawing wire at a predetermined speed and at approximately desired rates from a supply reel, a motor having a power pulley for rotating the rotor driving pulley, a variable speed pulley bodily movable between and connected by endless V-belts to the power and rotor driving pulleys, one or more solenoids for moving the variable speed pulley, a wire delivery wheel for paying out wire to a place of utilization, one or more bodily movable wire riding wheels coacting with one or more depending loops in the wire between the rotor and the delivery wheel, and an electric switch operable by the movable wheel to energize the single or multiple solenoids and to thereby slightly displace the variable speed pulley so as to maintain the rate of delivery of the wire stock synchronized with the demand for wire at the place of utilization.

A clear conception of the features constituting the present improvement, and of the construction and operation of a typical commercial wire feeder embodying the same, may be had by referring to the drawing accompanying and forming a part of this specification in which like reference characters designate the same or similar parts in the various views.

Fig. 1 is a part-sectional front elevation of one of the improved wire feeding units, showing the wire stock and a fragment of the wire supply reel in dot-and-dash lines;

Fig. 2 is a top view of the mechanism shown in Fig. 1, but with the supply reel and wire omitted;

Fig. 3 is a side view of the unit shown in Figs. 1 and 2, looking toward the wire receiving side of the machine;

Fig. 4 is an enlarged fragmentary front view of the solenoid control switch and actuating mechanism of the wire feeder;

Fig. 5 is a side view of the rotor and motor pulleys and of the variable speed pulley interposed therebetween;

Fig. 6 is an enlarged fragmentary side view of the speed-varying mechanism cooperating with the solenoids and with the manual adjusting mechanism;

Fig. 7 is an enlarged front view of the variable speed pulley, showing the same in minimum speed transmitting position;

Fig. 8 is a similarly enlarged front view of the same variable speed pulley, but showing the same in maximum speed transmitting position;

Fig. 9 is a side view of the rotor which initially withdraws the wire stock from the supply reel at either of two speeds, showing the same set for high speed withdrawal of the wire;

Fig. 10 is a front view of the same wire withdrawal rotor; and

Fig. 11 is an electrical diagram of the propelling motor, solenoids and control switch of the feeder.

While the invention has been shown and described herein as being especially applicable to feeders for longitudinally advancing and feeding insulation covered wire stock at a definite rate of speed from a supply reel to a wire cutting and insulation stripping machine or the like, it is not my desire or intention to unnecessarily restrict its utility to such a device; and it is also contemplated that specific descriptive terms employed herein be given the broadest possible interpretation consistent with the actual disclosure.

Referring to the drawings, the improved wire feeder shown therein comprises in general, a base plate 14 having a pair of wire supply reel supports 15 and a plat-

form 16 mounted thereon by upright rods 17, 18 respectively; a rotor 19 and a pressure roller 20 mounted upon the platform 16 and being cooperable to withdraw wire stock 21 from a supply reel 22 rotatably mounted upon the support 15; an electric motor 23 carried by the base plate 14 beneath the platform 16; a variable speed V-sheave or pulley 24 movable vertically between the base plate 14 and the platform 16 and being drivingly connected by V-belts 25, 26 with the motor power pulley 27 and with the rotor driving pulley 28 respectively; a wire delivery pulley or wheel 29 journaled on the platform 16 at the upper end of one of the column rods 18 for discharging wire stock 21 to a place of utilization; a vertically movable jockey wheel 30 riding by gravity within a depending loop 31 of the wire stock 21 between the rotor 19 and the delivery wheel 29; a pair of upper and lower solenoids 32, 33 respectively having vertically movable plungers 34 cooperable with one end of a lever 35 the opposite end of which is connected to a pivoted arm 36 supporting the sheave pulley 24, while the medial fulcrum 37 of the lever 35 is suspended from an adjusting screw 38; and an electric control switch 39 for the solenoids 32, 33 operable by the movement of the floating jockey wheel 30 to alternately energize these solenoids and to thereby move the variable speed pulley 24 in opposite directions.

The base plate 14 and the upper platform 16 should be of sturdy construction and the supporting rods 17, 18 for the supply roll 22 and platform 16 may be of any desired length depending upon the contemplated use of the feeding unit; and the feed rotor 19 is preferably rotated at the desired speed by means of a speed reducer 41 of well known construction mounted upon the platform 16 and which is driven by the upper sheave or pulley 28, see Figs. 1, 2 and 3. The pressure roller 20 is journaled on a lever 42 which has its swinging end portion connected to the platform 16 by a helical tension spring 43, and the rotor 19 is preferably provided with adjoining wire engaging portions 44, 45 of large and smaller diameter respectively with which the roller 20 and the wire stock 21 are interchangeably cooperable in order to vary the definite rate of withdrawal of the wire from the reel 22. With this assemblage, when the roller 20 and the wire 21 coact with the larger rotor portion 44 the wire stock will be withdrawn from the reel 22 at a higher rate of speed than when the roller and wire are caused to coact with the smaller rotor portion 45, and the journal shaft 46 of the press roller 20 and the fulcrum pivot 48 of the lever 42 are of sufficient length to permit this roller to be brought into coaction with either rotor portion 44, 45, as shown in Figs. 3 and 9. The platform 16 also has a small horizontal guide roller 47 vertically adjustably mounted thereon and which may be caused to coact with the wire 21 as it advances toward the feed rotor 19 in order to prevent excessive whipping of the wire stock.

The fixed or constant speed electric motor 23 which is mounted upon the base plate 14 and drives the wire prefeeder, should be electrically installed as shown in the diagram of Fig. 11, so that it will operate whenever the stripping machine or wire utilizing device is functioning, and stops when there is no demand for wire stock. The motor 23 is supplied with current from a supply line 49 through a starter 50 having an actuating coil 51 which is energized from the control circuit of the cutting and stripping machine, so that the prefeeder will always start and stop with the wire utilizing equipment; and an indicating device 52 which is adapted to be adjusted manually, should be set to the same reading as that of a similar device associated with the cutting and stripping mechanism. The power supply for the propelling motor 23 and for the solenoids 32, 33 may however be separate and independent from the power supply of the cutting and stripping machine or other wire utilizing device.

The variable speed V-sheave or pulley 24 with which

the endless V-belts 25, 26 coact and which is drivingly connected to the power pulley 27 by the belt 25 as shown in Fig. 5, is of well known construction. As illustrated in Figs. 7 and 8, this pulley 24 has two laterally spaced opposite end discs 54, 55 which are fixed on a bushing 53 which slides and rotates on the pulley shaft 56, and also has an axially movable intermediate disc 57 slidable along the bushing 53 and cooperable with the end discs 54, 55 to provide annular V-grooves of inversely variable diameter coacting with the belts 25, 26. The journal shaft 56 is firmly secured to the medial portion of the arm 36, the swinging end of which is connected to the solenoid actuated lever 35 by a link 58 as depicted in Fig. 6, and when the pulley 24 is in its extreme lower position as shown in Fig. 7, the motor propelled belt 25 will ride near the outermost peripheral portions of the discs 54, 57 and the driven belt 26 will simultaneously ride near the innermost portions of the discs 55, 57, whereas elevation of the pulley 24 to its highest position as in Fig. 8 will cause the belt 25 to ride near the innermost portions of the discs 54, 57 while the belt 26 will simultaneously ride along the outermost peripheral portions of the discs 55, 57.

The peripherally grooved wire delivery wheel 29 is rotatable about a fixed axis, but the peripherally grooved wire riding wheel 30 which is saddled in the wire loop 31, is rotatable about a shaft 60 carried by a vertically movable block 61 slidably engaging two of the upright fixed rods 18, see Figs. 1, 2 and 4. The base 14 of the unit is provided with a fixed guide 62 near the shaft 60, and the block 61 has an outwardly projecting pin 63 near its upper end, this pin 63 being movable between and alternately cooperable with two collars 64, 65 which are adjustably secured to a vertically movable switch actuating rod 66. The rod 66 is slidable in the fixed guide 62 and in a bracket 67 secured to the upper platform 16, and this bracket 67 is provided with a spring pressed plunger 68 which is urged into frictional engagement with the rod 66 by an adjustable helical spring 69 so as to normally hold the rod against axial movement while still permitting movement thereof in either direction by the pin 63 coacting with the collars 64, 65. The solenoid control switch 39 is preferably of the double throw micro type and has an actuating arm 70 provided with a roller 71 which is engageable by the cam shaped upper extremity 72 of the rod 66 whenever the latter is elevated by engagement of the pin 63 with the upper collar 64 so as to energize the coil of the lower solenoid 33. However when the pin 63 engages the lower collar 65, the coil of the upper solenoid 32 will be energized, while the coil of the lower solenoid 33 will automatically be de-energized.

The vertically spaced solenoids 32, 33 of which either one may obviously be replaced by a tension spring counteracting the other, are fixedly suspended from the platform 16 by means of a sturdy plate 74 to the lower portion of which the arm 36 is also swingably attached by a pivot pin 75, and the medial portion of which is provided with a guide projection 76 for the adjacent swinging end of the lever 35 which is pivotally attached to the solenoid plungers 34. The lever 35 which is swingable about the fulcrum 37 by the solenoid plungers 34 is vertically adjustable with the aid of the adjusting screw 38 which is journaled for rotation within a bearing 78 carried by the speed reducer 41, and has a manipulating hand wheel 79 secured to its upper extremity for effecting approximate adjustments, see Figs. 3 and 6, and a ladder chain 77 the medial portion of which coacts with a sprocket secured to the pointer of the indicator 52, has one end secured to the fulcrum 37 while its opposite end is attached to a helical tension spring. This assemblage is such that the lever fulcrum pivot 37 may be raised or lowered with the aid of the hand wheel 79 to manually vary the position of the pulley 24, and the lever 35 will also be automatically actuated by means of the solenoid plungers 34 to raise or lower this variable speed pulley,

while the manual shifting of the fulcrum will actuate the indicator pointer.

When the improved wire prefeeding unit has been constructed and assembled as above described the motor 23 may be started and the pre-feeder should first have its speed approximately synchronized with that of the wire cutting and stripping machine with which the feeder is to cooperate, with the aid of the hand wheel 79 and of the indexing device 52. This initial setting of the hand wheel 79 should preferably be such that it will take care of the average demand by the pulsating feed of the wire cutting and stripping machine. After such approximate synchronization has been effected and the wire 21 has been strung through the mechanism as indicated in dot-and-dash lines in Fig. 1, wire stock will be withdrawn from the supply reel 22 by the positively rotated rotor 19 and by the pressure roller 20 coacting therewith. If the demand is for relatively long successive lengths of wire 21 the wire stock should be caused to coact with the larger rotor portion 44 as in Figs. 9 and 10; and if this demand is for very short lengths, then the roller 20 and the wire 21 should be caused to coact with the pulley portion 45 of smallest diameter, but in either case the rotor 19 will be constantly rotated at a speed commensurate with the average demand for fresh wire stock.

Since the demand for wire 21 by the cutting and stripping machine is intermittent and other factors exist it is extremely difficult to obtain and to maintain precise control of the feed with the aid of the hand wheel adjustment alone. In order to insure such precise control of the total average feed, the floating wheel 30 cooperating with the wire loop 31, and the variable speed pulley 24 are provided, and function as follows. The loop 31 should be of sufficient length to normally provide enough wire stock in its downwardly and upwardly advancing stretches between the pulleys 29, 30 to meet the several pulsation demands for wire by the pulsating feed of the wire cutting and stripping machine without actuating the solenoids 32, 33; and the tension on the wire stock in these stretches of the loop will always be constant and equal to one half of the combined weight of the jockey pulley 30 and its supporting block 61. As the rate of wire delivery from the reel 22 decreases the loop 31 will gradually shorten and cause the movable wheel 30 and its supporting block 61 to rise, and if the upward sliding of the block 61 continues until the pin 63 thereof engages the upper collar 64 and raises the rod 66 sufficiently to throw the control switch arm 70 to the left as viewed in Fig. 4, then the lower solenoid 33 will be energized and will cause the plunger 34 thereof to swing the lever 35 in a counterclockwise direction as viewed in Figs. 3 and 6 thus causing the variable speed pulley 24 to move upwardly with the result that the feed rotor 19 will rotate at higher speed and will thereby tend to lengthen the loop 31.

If the rate of delivery of wire stock from the reel 22 increases beyond the demand, then the wheel 30 and the block 61 will gradually drop, and this descent of the block may continue until the pin 63 ultimately contacts the lower collar 65 on the rod 66 and thereby releases the switch actuating lever 70 which will then swing to the right as viewed in Fig. 4. This movement of the switch arm 70 will cause the upper solenoid 33 to become energized and to move its plunger 34 upwardly so as to swing the lever 35 in a clockwise direction as viewed in Figs. 3 and 6, thus causing the variable speed pulley 24 to descend with the result that the feed rotor 19 will rotate at a lower speed and will thereby tend to cause shortening of the loop 31. This automatic shortening of the wire loop 31 will cause the wheel 30 and its supporting block 61 to gradually rise and to repeat the cycle of operations.

The demand for wire stock by the cutting and stripping machine thus automatically controls the rate of withdrawal of the wire 21 from the supply reel 22 by causing the solenoids 32, 33 to be alternately energized so as to

elevate or lower the variable speed pulley 24 which in turn varies the speed of rotation of the feed rotor 19. The rotor 19 will normally be revolving continuously but at variable speed, and the hand wheel 79 and screw 38 which coacts with the fulcrum pivot 37 of the lever 35 may be utilized to effectively synchronize the operation of the prefeeder with that of the cutting and stripping machine. The pressure roller 20 which may be caused to coact with either portion 44, 45 of the rotor 19, and which is carried by the lever 42, is resiliently urged against the rotor periphery by the tension spring 43 so as to insure gradual but positive withdrawal of the fresh wire 21 from the reel 22 at a rate of speed commensurate with that of the wire demand regardless of the diameter of the supply of wire stock wound upon the reel; and the guide roller 47 which may be positioned closely above the advancing wire 21 serves to insure smooth entry of the wire stock to the initial feeding zone.

The rise and fall of the floating wheel 30 which rides within the wire loop 31 and of which there may be several successive sets arranged in series as shown in my Patent No. 2,560,204, granted July 10, 1951, is automatically effected by variations in the speed on the wire 21 as it is drawn away from the upper wheel 29, and this up and down movement of the wheel 30 causes the pin 63 to travel between the spaced collars 64, 65 carried by the switch actuating rod 66. Since these collars 64, 65 are adjustable with respect to the actuating rod, the timing of the actuation of the solenoid control switch may be varied to effectively meet the demand for wire stock, and the various adjustments provided in the unit therefore insure automatic functioning of the prefeeder with utmost precision after proper adjustments have been effected. The improved unit has proven highly satisfactory and successful especially when applied as a prefeeder for wire cutting and stripping machines, but it is not necessarily confined to such usage and may be utilized to deliver wire or the like to any other zone of intermittent or variable demand.

It should be understood that it is not desired to limit this invention to the exact details of construction and operation of the wire prefeeder herein specifically shown and described, for various modifications within the scope of the appended claims may occur to persons skilled in the art.

I claim:

1. In a mechanism for feeding wire from a reel to a pulsating source of utilization, a rotor operable at various selected constant speeds to withdraw wire from the reel and having a propelling pulley, a motor having a power pulley for driving said rotor propelling pulley, a variable speed transmission bodily movable in opposite directions between and being operatively connected to said pulleys, a lever movably supporting said transmission, means for selectively varying the position of the fulcrum of said lever to cause said rotor to deliver the wire in accordance with the average demand at the source of utilization, opposed solenoids coacting with said lever to move said transmission in opposite directions, a wire guide wheel for paying out the wire to the pulsating source of utilization, a jockey wheel riding by gravity in a depending loop of sufficient length to meet at least one pulsation demand from said source, said loop being located in the advancing wire between said rotor and said guide wheel and said jockey wheel constantly maintaining uniform tension on the wire stock in said loop, and a switch operable by the rise and fall of said jockey wheel to alternately energize said solenoids and to thereby displace said transmission in opposite directions to maintain constant speed of the wire within the limits of said average demand.

2. In a mechanism for feeding wire from a reel to a pulsating source of utilization, a rotor operable at various selected constant speeds to withdraw wire from the reel and having a propelling pulley, a motor having a power pulley for driving said rotor propelling pulley, a variable

speed transmission bodily movable in opposite directions between and being operatively connected to said pulleys, a lever movably supporting said transmission, means for selectively varying the position of the fulcrum of said lever to cause said rotor to deliver the wire in accordance with the average demand at the source of utilization, opposed solenoids coacting with said lever to move said transmission in opposite directions, a wire guide wheel for paying out the wire to the pulsating source of utilization, a jockey wheel having a support movable along a definite path and riding by gravity in a depending loop of sufficient length to meet at least one pulsation demand from said source, said loop being located in the advancing wire between said rotor and said guide wheel and the weight of said jockey wheel and its support constantly maintaining uniform tension on the wire stock in said loop, and a switch operable by the rise and fall of said jockey wheel support to alternately actuate said solenoids and to thereby displace said lever and said transmission in opposite directions to maintain constant speed of the wire within the limits of said average demand.

3. In a mechanism for feeding wire from a reel to a pulsating source of utilization, a rotor operable at various selected constant speeds to withdraw wire from the reel and having a propelling pulley, a motor having a power pulley for driving said rotor propelling pulley, a variable speed pulley bodily movable in opposite directions between and being operatively connected by belts to said power and propelling pulleys, a lever movably supporting

said variable speed pulley, means for selectively varying the position of the fulcrum of said lever to cause said rotor to deliver the wire in accordance with the average demand at the source of utilization, opposed solenoids coacting with said lever to move said variable speed pulley in opposite directions, a wire guide wheel for paying out the wire to the pulsating source of utilization, a jockey wheel riding by gravity in a depending loop of sufficient length to meet several demand pulsations from said source, said loop being located in the advancing wire between said rotor and said guide wheel and the weight of said jockey wheel constantly maintaining uniform tension on the wire stock in said loop, and a switch operable by the rise and fall of said jockey wheel to alternately energize said solenoids and to thereby displace said variable speed pulley in opposite directions to maintain constant speed of the wire within the limits of said average demand.

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