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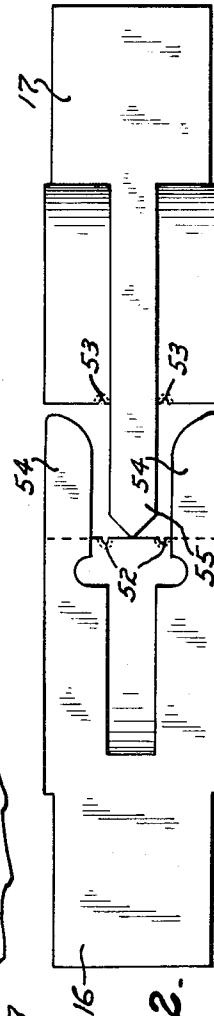
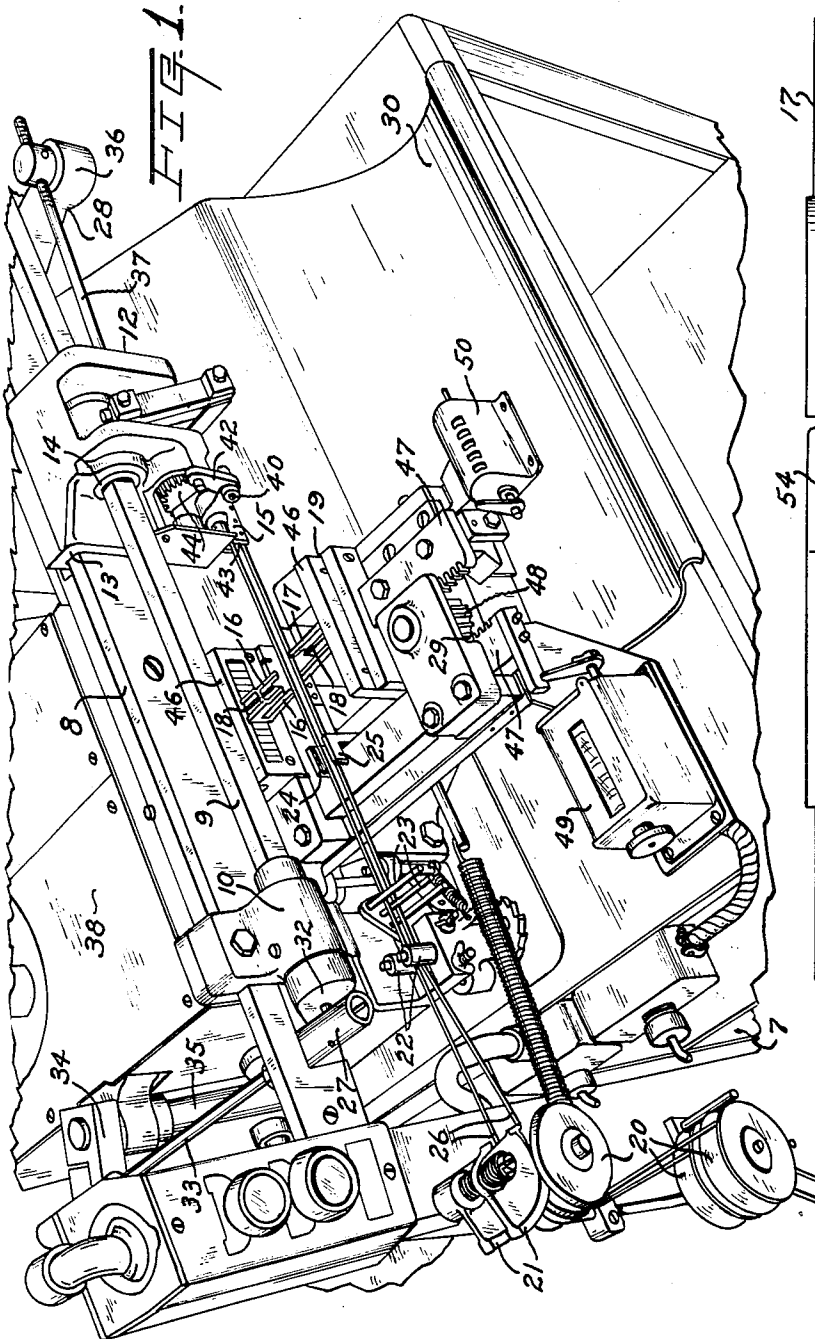
H. W. HAGSTRAND

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MULTIPLE WIRE CUTTER AND STRIPPER

Filed April 30, 1956

2 Sheets-Sheet 1



INVENTOR.
H. W. Hagstrand
BY

Lieber & Lieber
ATTORNEYS.

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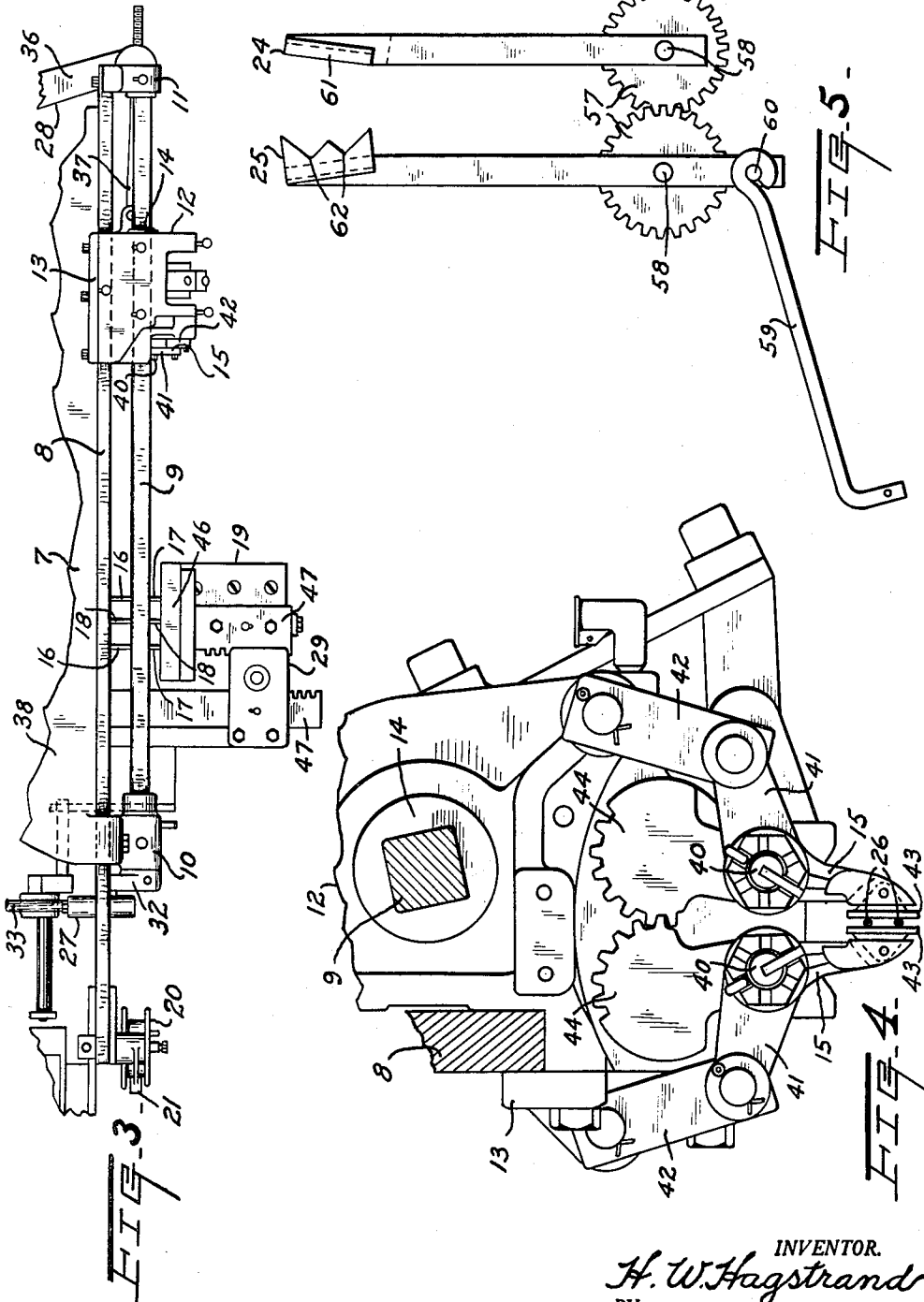
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ATTORNEYS.

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MULTIPLE WIRE CUTTER AND STRIPPER

Helge W. Hagstrand, Milwaukee, Wis., assignor to Artos Engineering Company, Milwaukee, Wis., a corporation of Wisconsin

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4 Claims. (Cl. 81—9.51)

This invention relates in general to improvements in the art of producing electric current conductors, and relates more particularly to improvements in the construction and operation of machines for simultaneously severing several insulation covered wires into predetermined lengths and for stripping the insulation from one or both ends of each wire length.

The primary object of my invention is to provide mechanism for automatically producing a succession of end stripped insulated wires with utmost rapidity and precision.

It has heretofore been common practice in the electrical industry to utilize various types of mechanisms in order to sever a single insulation covered wire into successive predetermined lengths and to remove the insulation from one or both ends of each severed length so that the bared ends of the wires could be effectively attached to binding posts or terminals. The insulation is ordinarily removed from the wire ends by stripping, and while some of these prior cutting and stripping machines were operable at relatively high speed, the prior mechanisms were all of limited capacity and could not meet the tremendous demand for such end stripped conductors except by providing large numbers of the individual machines. This multiplication of units not only increased the cost of equipment required, but also enhanced the normal power consumption and operating cost since each mechanism required an independent drive and an attendant for insuring proper operation thereof.

It is therefore an important object of the present invention to provide an improved insulated wire cutter and stripper operable at high speed to automatically sever wire stock withdrawn from several independent sources of supply into predetermined successive lengths and to simultaneously strip the insulation from one or both ends of each set of simultaneously severed wires.

Another important object of this invention is to provide a unit for producing electric current conductors with utmost precision and in rapid succession at minimum cost of equipment installation, power consumption, and attendant services.

A further important object of the invention is to provide relatively slight and inexpensive modifications which may be readily applied to an ordinary insulated wire cutting and stripping mechanism of the type shown in United States Patent No. 2,680,394, granted June 8, 1954, to vastly enhance the capacity of such machines.

Still another important object of my invention is to provide a simple, durable and compact unit of maximum dependability and capacity for converting several independent strands of insulated wire stock into successive end stripped electrical conductors automatically and with minimum attention and power consumption.

These and other more specific objects and advantages of the invention will be apparent from the following detailed description.

A clear conception of the features constituting the present improvement, and of the construction and opera-

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tion of a typical multiple wire cutter and stripper embodying the invention, may be had by referring to the drawings accompanying and forming a part of this specification wherein like reference characters designate the same or similar parts in the various views.

Fig. 1 is a fragmentary perspective view of the insulated wire stock feeding, cutting and stripping mechanisms of a commercial machine built in accordance with the invention;

Fig. 2 is an enlarged plan view of a cooperating set of the improved insulation cutting and stripping blades utilized in the improved machine;

Fig. 3 is a plan view of the wire stock feeding, cutting and stripping mechanisms, drawn to reduced scale;

Fig. 4 is an enlarged fragmentary side view of the single wire feeding and stripping clamp assemblage also utilized in the improved machine; and

Fig. 5 is a similarly enlarged side view of the cooperating wire guiding and holding fingers utilized near the cutting and stripping zone of the improved unit.

While the invention has been illustrated and described herein as being embodied in a multiple wire cutting and stripping machine adapted to simultaneously sever and end strip only two wires, it is not intended to restrict the use of the improved features to such a unit; 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 typical commercial multiple insulated wire cutter and stripper shown, comprises in general, an elongated main frame 7 having an elongated horizontal beam 8 fixedly attached thereto; a likewise elongated horizontal square shaft 9 journaled in end bearings 10, 11 carried by the frame 7 and being located forwardly of the beam 8; a single wire clamp assemblage 12 having a main frame provided with a rear guide 13 slidable along the fixed beam 8 and a collar 14 rotatable within the frame and slidable along the shaft 9 and which is also operable by oscillation of this shaft to open and close a pair of wire clamping jaws 15 forming a part of the assemblage 12; a pair of laterally spaced sets of insulation severing and stripping blades 16, 17 and a single intervening set of wire severing knives 18 carried by a tool holder 19 mounted upon the frame 7; several independent wire stock supply sheaves 20 cooperating with non-return wire guiding segments 21 and with guide rollers 22, pins 23 and fingers 24, 25 to properly conduct several wires 26 from suitable independent sources to and through the cutting and stripping zone; mechanism 27 for periodically oscillating the square shaft 9; other mechanism 28 for moving the clamp assemblage 12 along the shaft 9; still other mechanism 29 mounted upon the tool holder 19 for actuating the blades 16, 17 and knives 18; and a receiving trough 30 for the final severed and end stripped conductors.

The main frame 7 may be of any suitable construction and the guide beam 8 has rectangular cross-section and is detachably secured to the frame by screws and by the bearings 10, 11 for the square shaft 9 as indicated in Figures 1 and 3. The square shaft 9 has cylindrical end portions oscillatable within the bearings 10, 11 and the mechanism 27 for producing such periodic oscillation is located near the bearing 10 and includes a crank 32 and a rod 33 reciprocable by another crank 34 secured to an upright shaft 35. The mechanism 28 for moving the clamp assemblage 12 longitudinally of the square shaft 9 in timed relation to the oscillation of this shaft by the mechanism 27, includes a lever 36 and a connecting rod 37 pivotally attached to the assemblage 12 and adjustably secured to the swinging end of the lever 36; and both of the mechanisms 27, 28 are of relatively well known construction and are operable by an electric

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motor housed within the frame 7 and coaxing with motion transmitting gearing confined within a casing 38 disposed rearwardly of the beam 8, as shown in Figs. 1 and 3.

The wire clamp assemblage 12 as shown in detail in Patent No. 2,680,394, has its wire engaging jaws 15 which are mounted on pivots 40 supported by the same frame which carries the collar 14, formed as bell cranks having outwardly extending arms 41 pivotally connected by links 42 with pivots also mounted on the frame and which are oscillatably connected with the collar 14 of the assemblage, and these bell cranks also have downwardly projecting arms carrying special pivotally suspended wire engaging plates 43 provided with flat surfaces for simultaneously gripping several parallel intervening wires 26 as illustrated in Fig. 4. The two jaws 15 are swingable toward each other to grip the wire and away from each other to elevate the jaws above the tool holder whenever the shaft 9 is oscillated in opposite directions about its axis, by means of intermeshing gear segments 44 which are also attached to the pivots 40, and the pivotal mounting of the gripping plates 43 enables them to firmly clamp more than one intervening wire 26 even if the diameters thereof vary slightly.

The tool holder 19 which carries the insulation cutting and stripping blades 16, 17 and the wire severing knives 18 is also of relatively well known construction, and the blades 16, 17 are adjustable relative to the knives 18 to vary the stripping lengths. The opposed blades 16, 17 and knives 18 are firmly but detachably secured to oppositely reciprocable carriers 46 mounted on racks 47 operable by an intervening pinion 48 as shown in Figs. 1 and 3, and these racks and pinions constitute a part of the cutting and stripping mechanism 29 which is adapted to also be actuated in timed relation to the movements of the clamp assemblage 12 by gearing confined within the casing 38, in a well known manner. The reciprocable racks 47 may be caused to cooperate with automatic counters 49, 50 in order to indicate the number of conductors which have been produced.

In order to cause the cutting and stripping blades 16, 17 to properly cooperate with several wires 26, each of these blades is especially constructed as shown in Fig. 2, with laterally spaced pairs of cooperating insulation cutting notches 52, 53 and with the wire guiding and separating tongues 54, 55 respectively. Each of these notches 52, 53 is provided with a semicircular cutting edge adapted to sever the insulation only without cutting into the body of an intervening wire, and the wire severing knives 18 which are located between the two sets of blades 16, 17 have cooperating cutting edges which are wider than the space between the tongues 54 so that they will cut through both the insulation and the wire body at the point of severance of the successive wire lengths. When the blades 16, 17 are brought together the tongues 54, 55 of the two blades overlap the adjacent blades so as to confine the cutting edges of all of the notches 52, 53 to a common plane.

In order to properly introduce, guide and position several wires 26 within the unit, it is necessary to provide the same number of cooperating sheaves 20 for withdrawing insulated wires 26 from a like number of independent sources of supply, and to also provide for subsequent maintenance of the wire stock in parallelism. Each of the final delivery sheaves 20 is journaled upon the main frame 7 and has a non-return wire guiding segment 21 associated therewith so as to prevent the wires 26 which have passed the adjacent segments from returning to the supply source. The upright guide rollers 22 located beyond the sheaves 20 and segments 21 arrange the entering wire stock in a vertical plane, and the horizontal pins 23 disposed beyond the rollers 22 are adjustable so as to properly space the several wires 26

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apart vertically. Both the set of rollers 22 and the pins 23 are also mounted upon the main frame 7 and perform their guiding and spacing functions automatically when properly adjusted, as the wires 26 are withdrawn therebetween by the clamp assemblage 12.

The auxiliary wire guiding fingers 24, 25 which are carried by the tool holder directly in advance of the cutting and stripping zone, function primarily to support the wires 26 when feeding and cutting long lengths greater than the stroke of the clamp 12. As shown in Fig. 5, these fingers 24, 25 are interconnected and operated by gears 57 secured to the finger supporting pivots 58 and are normally urged toward each other so that the two fingers will tend to close when not positively retained, but they are adapted to be periodically spread apart by a connection 59 attached to a pin 60 at the lower extremity of the longer finger whenever wires are being longitudinally advanced therebetween. The upper end of the finger 24 is provided with a series of flat wire engaging elements 61 cooperable with serrations 62 forming notches corresponding to the number of wires 26 being cut and stripped on the other finger 25 to maintain the several wires properly spaced apart while being cut and stripped, but the fingers 24, 25 do not positively clamp the wires 26 and are periodically spread apart to permit the clamp 12 to pass therebetween when feeding successive sections of long wire lengths.

When the improved insulated wire cutter and stripper has been properly constructed, assembled and adjusted to produce end stripped conductors of the desired length, the normal operation of the unit is as follows. After each simultaneous cutting operation of the blades 16, 17 and knife 18, the feed clamp assembly 12 with its gripping jaws 15 in clamping engagement with the severed wires 26 beyond the cutting and stripping zone, is moved toward the right as viewed in Figs. 1 and 3 to cause the right hand set of stripping blades 16, 17 to strip the insulation from the trailing ends of the previously severed wires 26. While the severed leading ends of the wire stock are still being held by the fingers 24, 25 and by the other set of stripping blades 16, 17, the jaws 15 of the clamp assembly 12 will separate so as to deposit the final end stripped conductor into the trough 30, whereupon the clamp assembly 12 with the jaws 15 still separated and in elevated condition is moved toward the left past and above the cutting zone and the jaws 15 are brought down and into gripping engagement with the wire stock between the fingers 24, 25 and the guide pins 23.

The clamp assembly 12 will then move a slight distance farther toward the left to cause the left hand set of blades 16, 17 to strip the severed insulation from the leading end of the wire stock, whereupon the blades 16, 17 and knives 18 and the fingers 24, 25 will separate to permit the clamp assembly 12 with its jaws 15 closed to move toward the right through the cutting zone and to thereby withdraw new length of wire stock from the sources of supply. When the clamp assembly 12 has thus advanced toward the right a predetermined distance it will stop and the knife 18 will then function to sever another predetermined length of wire 26 from the stock while the blades 16, 17 will simultaneously cut through the insulation only at definite distances on opposite sides of the point of wire severance.

This cycle of operations will be automatically repeated until the desired number of completed end stripped conductors have been produced whereupon the machine may be stopped automatically by pre-setting the counters 49, 50 to cause such stoppage, or by manual operation of a stop switch such as shown at the left of Fig. 1. As shown, two finished and identical end stripped conductors are produced during each cycle of operations, but the unit may obviously be readily modified to produce more than two conductors simultaneously, thus insuring

maximum capacity with minimum power consumption and at high rate of speed.

The multiple sheaves 20, improved guide rollers 22 and pins 23, and the improved holding fingers 24, effectively introduce and guide the incoming wire stock for proper cooperation with the dual stripping blades 16, 17 and the length of the successive conductors can be readily varied by correspondingly changing the stroke of the single clamp assembly 12 with the aid of the mechanism associated with the lever 36. The multiple cutting and stripping unit is practically as simple and compact as a similar prior mechanism adapted to produce only single successive conductors during each complete operating cycle, and the improved unit is operable at the same speed as such prior mechanisms but has vastly greater capacity. The invention has gone into highly satisfactory and successful commercial use, and the improved machines are capable of operating on insulated wires of various diameters to produce conductors for diverse uses.

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

I claim:

1. A multiple wire cutter comprising, a frame, a tool holder carried by said frame, cooperating wire severing knives mounted upon said holder and being movable to simultaneously sever several wire lengths from stock fed past the knives, several independent sources of wire stock supply associated with said frame remote from said tool holder, a feed clamp having cooperating self-adjusting pivotally suspended wire gripping plates for simultaneously withdrawing predetermined equal lengths of wire stock from all of said sources and for advancing the wires longitudinally past said knives, a pair of rollers cooperable with the advancing wire stocks near said sources to cause the wires to travel longitudinally in a common plane, spaced parallel pin elements coacting with the advancing wire stocks between said rollers and said knives to cause the wires to travel in parallel spaced relation toward the knives, and a pair of wire guiding members pivotally mounted upon said tool holder and being frictionally cooperable with the advancing wire stocks between said pin elements and said knives and cooperating with the knives to produce similarly spaced and parallel travel of the wires closely adjacent to and past the knives.

2. A multiple wire cutter and stripper comprising, a frame, a tool holder carried by said frame, cooperating sets of wire severing and insulation stripping blades mounted upon said holder and being movable to simultaneously sever and to subsequently end strip insulation from several wire lengths severed from insulated wire stock being fed past the knives, several independent sources of insulated wire stock supply associated with said frame remote from said tool holder, a wire clamp having self-adjusting wire gripping plates for simultaneously withdrawing predetermined equal lengths of wire stock from all of said sources and for advancing the wires longitudinally past said knives, a pair of rollers cooperable with the advancing wire stock near said sources to cause the wires to travel longitudinally in a common plane, spaced parallel pins coacting with the horizontally advancing wire stock between said rollers and said knives

to cause the wires to travel in parallel spaced relation toward the knives, and a pair of wire guiding fingers carried by said tool holder and being frictionally cooperable with the horizontally advancing wire stock between said pins and said knives and cooperable with each other to effect similarly spaced and parallel travel of the wires closely adjacent to the knives.

3. A multiple wire cutter comprising, a frame, a tool holder carried by said frame, cooperating wire severing knives mounted upon said holder and being movable to simultaneously sever several wire lengths from stock fed past the knives, several independent sources of wire stock supply associated with said frame remote from said tool holder, a feed clamp having cooperating self-adjusting wire gripping plates for simultaneously withdrawing predetermined equal lengths of wire stock from all of said sources and for advancing the wires longitudinally past said knives, guiding means cooperable with the advancing wire stocks near said sources to cause the wires to travel longitudinally in a common plane, a guide element coacting with the advancing wire stocks between said guiding means and said knives to cause the wires to travel in parallel spaced relation toward the knives, and a pair of wire guiding members pivotally mounted upon said tool holder and being frictionally cooperable with the advancing wire stocks between said element and said knives and cooperating with the knives to produce similarly spaced and parallel travel of the wires closely adjacent to and past the knives.

4. A multiple wire cutter and stripper comprising, a frame, a tool holder carried by said frame, cooperating sets of wire severing and insulating stripping blades mounted upon said holder and being movable to simultaneously sever and to subsequently end strip insulation from several wire lengths severed from insulated wire stock being fed past the knives, several independent sources of insulated wire stock supply associated with said frame remote from said tool holder, a wire clamp having self-adjusting wire gripping plates for simultaneously withdrawing predetermined equal lengths of wire stock from all of said sources and for advancing the wires longitudinally past said knives, guiding means cooperable with the advancing wire stock near said sources to cause the wires to travel longitudinally in a common plane, a guide element coacting with the horizontally advancing wire stock between said guiding means and said knives to cause the wires to travel in parallel spaced relation toward the knives, and wire guiding members carried by said tool holder and being frictionally cooperable with the horizontally advancing wire stock between said element and said knives and cooperable with each other to effect similarly spaced and parallel travel of the wires closely adjacent to the knives.

References Cited in the file of this patent

UNITED STATES PATENTS

1,052,271	Pessin	Feb. 4, 1913
1,509,044	Kuchmuk	Sept. 16, 1924
1,835,801	Mayhew	Dec. 8, 1931
1,936,559	Williams	Nov. 21, 1933
2,485,518	Vermette	Oct. 18, 1949
2,571,078	Vollmer	Oct. 9, 1951
2,571,338	Calabrese	Oct. 16, 1951
2,680,394	Andren	June 8, 1954
2,774,130	Folkenroth	Dec. 18, 1956
2,844,056	Sladek	July 22, 1958