

AN APPARATUS FOR PEELING AND TWISTING AN ELECTRIC WIRE
HAVING AN INSULATING COATING

The present invention relates to an apparatus for peeling and twisting an electric wire having an insulating coating, and more particularly to an apparatus utilizing cams as actuating media.

5 For peeling and twisting an electric wire having an insulating coating, there is a device known as Rotary type, as shown in Figs. 1A, 1B & 1C. A work wire 1 is inserted into the work conduit 2 and against a stopper 3. Upon inserting, work wire 1 pushes the
10 rotating cutter 4 which is mounted by an elastic member 5 on a cutter seat 6, and is urged by rotating cutter 4. Rotating cutter 4 is rotated about work wire 1 to cut the insulating coating 7 of work wire 1. When work wire 1 is pulled outwardly, the cut insulating coating
15 7' is blocked by rotating cutter 4 which then returns to its unstressed position and thus engages and twists the conductors 8 of work wire 1, as shown in Fig. 1B. However, with work wire 1 to push and be urged against by rotating cutter 4, it is inclined to damage the
20 conductors of a work wire. Moreover, such Rotary type device can only deal with a single work wire at a time. In addition, it is impossible to control the tightness of the conductors of a work wire to be twisted merely with one's hand to pull the work wire out of the work
25 conduit.

It is therefore attempted to overcome the shortcomings described above.

According to the present invention, an apparatus for peeling and twisting an electric wire
5 having an insulating coating comprises a shaft rotatably mounted on a machine frame and having wire clamping, insulating coating cutting, conductor twisting and cut insulating coating disengaging cams, a wire clamping means mounted on the frame and following the clamping
10 cam and a machine body which is movably mounted on the shaft and urged by an elastic member to an end position on the shaft and has an insulating coating cutting means following the insulating coating cutting cam for cutting the insulating coating, a conductor twisting means
15 following the twisting cam for twisting the conductors of the wire and a cut insulating coating disengaging means following the disengaging cam for disengaging the insulating coating which has been cut. The cams of the shaft and their following means are in such arrangement
20 that they will perform the actions of clamping the wire, cutting the insulating coating, twisting the conductors and disengaging the cut insulating coating when the shaft is revolved a cycle.

The clamping means can include a clamping lever
25 being pivotally mounted on the frame and being urged to follow the wire clamping cam, a movable clamping foot mounted on the clamping lever and a fixed clamping foot

secured to the frame and in a position opposite to the movable clamping foot. The movable and fixed clamping feet will clamp and release a work wire in due time when the clamping lever follows the wire clamping cam and in turn sets the movable clamping foot in cooperation with the fixed clamping foot to clamp the wire.

The insulating coating cutting means can include a pivoted insulating coating cutting lever being urged to follow the cutting cam, a movable cutting lip mounted on the cutting lever and a fixed cutting lip secured to the machine body and in a position opposite to the movable cutting lip. The cutting lips will cut the insulating coating when the cutting lever follows the cutting cam and thus in turn sets the movable cutting lip in cooperation with the fixed cutting lip to cut the insulating coating.

To define the length of the insulating coating to be cut, there may be provided with a wire stopper inside the machine body to act as an obstacle of the work wire to be inserted into the work place of the present apparatus.

The wire stopper can also be engaged by a threaded bolt to adjust the length of the insulating coating to be cut.

A fine tuning means may be provided with for finely tuning the clearance between the cutting lips for cutting the insulating coating of different wire gauge.

Such fine tuning can be achieved by a rod, a section of which is shaped to bear a cam surface having different distances between its each side surface and the axis of the rod and with its each side surface
5 engages with the cutting lever for differently and finely setting the clearance between lips.

For causing the cutting lever to smoothly follow the cutting cam, an intermediate follower can be mounted between the cutting cam and the cutting lever.

10 Further, the cutting cam may further include an additional cam surface to slightly lift up further the movable cutting lip to prevent it from scraping the conductors when the twisting action is executing.

The conductor twisting means can include two
15 sliding pieces each of which has a hollow central portion, an active slide piece following the twisting cam and having two inclined surfaces to respectively engage with the hollow central portions of the two sliding pieces to cause the sliding pieces in relative
20 motion, a pivoted wire conductor twisting lever being urged to follow the cutting cam, a first twisting piece movably mounted on the twisting lever, a second twisting piece movably mounted on the machine body and being opposite to the first twisting piece and two connecting
25 pieces connecting the sliding pieces and the twisting pieces. The conductors are twisted by the relative motion of the twisting pieces when the sliding pieces

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are actuated by the active slide piece and thus actuate the connecting pieces which in turn set the twisting pieces in relative motion.

A conductor protector may be provided with for
5 lifting up the second twisting piece to be higher than the fixed cutting lip when the twisting pieces are in relative motion so that the conductors can be successfully twisted without being harmed.

The conductor protector can include a seventh
10 elastic member mounted on the machine body, an upper lever having a third fulcrum being pivoted on the machine body and an end being urged by the seventh elastic member against and following the twisting cam, an eighth elastic member mounted on the machine body, a
15 lower lever having a fourth fulcrum being pivoted on the machine body and one end of which is secured to the second twisting piece and urged upwardly by the eighth elastic member and a straight piece having its two ends respectively secured to the end of the upper lever and
20 the other end of the lower lever and the second twisting piece not only is movably mounted on the machine body in its longitudinal direction but also is movably mounted on the machine body in its transverse direction and the exerted strength of the eighth elastic member on the
25 lower lever is smaller than that of the seventh elastic member on the end of the upper lever and thus in turn on the lower lever through the transmission of the straight

piece so that when the straight piece is urged down by a cam surface on the twisting cam the eighth elastic member will urge the second twisting piece up to be higher than the fixed cutting lip for being cooperated
5 with the first twisting piece to twist the conductors without harming the conductors.

Generally a fourth elastic member is to urge down the conductor twisting lever on which the exerted strength of the fourth elastic member is slightly
10 smaller than that of the eighth elastic member urging up the second twisting piece so that the twisting pieces can twist the conductors without harming the conductors in the work wire of any wire gauge.

Between the twisting cam and the active slide
15 piece, there may also be mounted an intermediate follower for causing the active slide piece smoothly following the twisting cam.

Between the twisting cam and the active slide piece, there may be provided with a tightness adjusting
20 means for selecting the tightness of the conductors to be twisted.

The tightness adjusting means can be an adjustable tapered piece and with its tapered surface to define the effective stroke length of the active slide
25 piece to follow the twisting cam.

The cut insulating coating disengaging means may include a little ridge provided on the disengaging

cam and a stopping member which can engage with the disengaging cam and thus translates the machine body a length for causing the twisting means to twist the conductors more effectively and disengages the cut

5 insulating coating when the stopping member engages with the little ridge of the disengaging cam to translate the machine body a little more length.

The disengaging cam is so shaped that it has a first surface to engage with one end of the stopping
10 member for translating the machine body and a second surface to free from engaging with the stopping member.

The stopping member may be provided with an indentation near the other end of the engaging end. A double disk member has two disks of different diameters,
15 the larger disk of which is geared and the member has an annular groove between the two disks to get the rim of the smaller disk to engage with the indentation of the stopping member for varying the translation length of the machine body since the double disk member has a
20 threaded shaft rotatably mounted on the machine body.

The threaded bolt of the wire stopper and an adjusting medium of the adjustable tapered piece may be plate-geared. Both of the plate-geared bolt and the adjusting medium as well as the geared disk member may
25 be engaged with and adjusted by an adjusting set outside the machine frame.

It is therefore an object of the present

invention to provide an apparatus for preferably
executing insulating coating cutting, conductors
twisting and cut insulating coating disengaging
functions in a neat manner and within a short time.

5 It is another object of the present invention
to provide an apparatus capable of processing a work
wire of various gauge.

 It is yet an object of the present invention to
provide an apparatus which can peel and twist the single
10 or multiple work wires at a time.

 It is further an object of the present
invention to provide an apparatus for peeling and
twisting an electric wire having an insulating coating
and the tightness of the conductors of the wire to be
15 twisted is adjustable.

 It is an additional object of the present
invention to provide an apparatus for peeling and
twisting an electric wire and making no harm to the work
wire processed.

20 These and other advantages of the present
invention may best be understood with reference to the
drawings, in which:

 Fig. 1A is a schematic view of a prior, known
as a Rotary type, device for peeling and twisting an
25 electric wire;

 Fig. 1B is a schematic view of a Rotary type
device, in which the rotating cutter returns to its

unstressed position when the work wire is pulled;

Fig. 1C is a schematic view showing the work wire which has been processed in a Rotary type device;

Fig. 2 is a perspective view showing an upper
5 machine frame incorporated with a machine body as well as a lower machine frame and a side plate of a machine frame of the present invention in separate position;

Fig. 2A is a perspective view showing a
finished multi-wires cable at a fixed clamping foot
10 position of the present invention;

Fig. 3 is a partly exploded view of a machine body of the present invention of an apparatus for peeling and twisting an electric wire having an insulating coating;

15 Fig. 4 is a perspective view of a wire clamping means of the present invention;

Fig. 5 is an exploded view of an insulating coating cutting means, a conductor protector and a conductor twisting means of the present invention;

20 Fig. 6 is a side view better showing a conductor protector of the present invention;

Fig. 7 is a perspective view of a cut insulating coating disengaging means of the present invention;

25 Fig. 7A is a sectional view showing a stopping member engaging with a double disk member of the present invention;

Fig. 7B is a perspective view showing a disengaging cam of the present invention;

Fig. 8 is a schematic view showing an adjusting set of the present invention;

5 Fig. 9 is an exploded view of a fine tuning means of the present invention; and

Fig. 9A is a sectional view showing how a fine tuning rod of a fine tuning means engages with an insulating coating cutting lever of the present
10 invention.

Referring now to Fig. 2, there is shown an upper machine frame 12, a shaft 11 rotatably mounted on upper frame 12, a machine body 2345 movably mounted on shaft 11, a lower machine frame 13 having a slide groove
15 15 and a machine frame side plate 14 which connects upper frame 12 and lower frame 13 with a plurality of screws 1234 screwed at its upper and lower sides. Shaft 11 is provided with a geared transmission wheel 17 adapted to be driven by a electromagnetic clutch (not
20 shown) which in turn is driven by a motor (not shown) and controlled by a micro switch 19 mounted on upper frame 12. The geared transmission wheel 17 is provided with a micro switch contact breaker 18 which disconnects the electromagnetic clutch with geared transmission
25 wheel 17 of shaft 11 when it contacts micro switch 19. Machine body 2345 has two slide wheels 3141, 3142 which can slide in slide groove 15 of lower frame 13.

A shaft 11 coaxial spring 110 is mounted between an end of shaft 11 near geared transmission wheel 17 and one shaft mounting side 111 of machine body 2345 to urge machine body 2345 to another end position of shaft 11, as shown in Fig. 3. Shaft 11 is provided with a wire clamping cam 201, an insulating coating cutting cam 301, a conductor twisting cam 401 and a cut insulating coating disengaging cam 501. With the other shaft mounting end 112 of machine body 2345 and the shaft mounting side 111, machine body 2345 is movably mounted on shaft 11. Machine body 2345 has an insulating coating cutting means 300, a conductor twisting means 400 and a cut insulating coating disengaging means 500 mounted to follow the insulating coating cutting cam 301, conductor twisting cam 401 and cut insulating coating disengaging cam 501 of shaft 11 respectively. Machine body 2345 also has a front piece 1131 and a back piece 1132 for mounting the means 300, 400 and 500 therein.

A wire clamping means 200 of the present invention, as shown in Fig. 4, includes a clamping lever 202, a movable clamping foot 2071 and a fixed clamping foot 2072. Clamping lever 202 has an end pivoted on a lever support 203 which is fixed to upper frame 12 and has a flange 204 through a hole of upper frame 12 to engage with wire clamping cam 201. A spring 205 is introduced to urge flange 204 of clamping lever 202 to

follow clamping cam 201. The other end of clamping lever 202 is mounted movable clamping foot 2071 received in a clamping foot retainer 206 which is fixed to upper frame 12. Fixed clamping foot 2072 is secured on lower frame 13 and in a position opposite to movable clamping foot 2071. The wire clamping cam 201 is so shaped that movable and fixed clamping feet 2071, 2072 will clamp and release a work wire in due time when clamping lever 202 follows wire clamping cam 201 and in turn sets movable clamping foot 2071 in cooperation with fixed clamping foot 2072 to process the work wire.

An insulating coating cutting means of the present invention, as shown in the right half in Fig. 5, includes an insulating coating cutting lever 303, a movable cutting lip 3041 and a fixed cutting lip 3042. Cutting lever 303 has two lugs 3030 as fulcrums pivotally mounted on two holes of front and back pieces 1131, 1132 of machine body 2345. An intermediate follower 302 is mounted between cutting cam 31 and cutting lever 303 on back piece 1132 for smoothly transmitting the cam action. Movable cutting lip 3041 is mounted on the other end of cutting lever 303 through a cutting lip retainer 3012 screwed on a securing block 306 which is mounted on pieces 1131, 1132 of machine body 2345. Fixed cutting lip 3042 is screwed on another securing block 314 which is mounted on pieces 1131, 1132 of machine body 2345 and provides with slide wheel 3141

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for sliding in slide groove 15 of lower frame 13.

A fine tuning rod 305 mounted between securing block 306 and cutting lever 303 functions as a finely tuning means of the lips and will be illustrated

5 somewhat later.

A conductor twisting lever 311 is described here affixedly because it is actuated by cutting cam 301 and will do a help of the cutting of cutting lips 3041, 3042. Twisting lever 311 has two lugs 3110 as fulcrums
10 pivotally mounted on two holes of front and back pieces 1131, 1132 of machine body 2345. A pressing rod 308 through a hole 3080 of cutting lever 303 and a rod guiding block 309 which is secured to pieces 1131, 1132 to transmit the cam action to twisting lever 311. An
15 upper twisting piece 4091 has a central longitudinal groove movably engaged with an end of twisting lever 311 and is in a position opposite to a lower twisting piece 4092 which has an upper longitudinal groove 4095 and a lower longitudinal groove 4096 and is movably engaged
20 between securing block 314 and lower cutting lip 3042. Twisting pieces 4091, 4092 will grip the work wire for the cutting lips 3041, 3042 to accurately cut the insulating coating of the work wire when cutting lever 303 and pressing rod 308 free from a first cam surface
25 3010 of cutting cam 301. At this time a tension spring 307 mounted between cutting lever 303 and securing block 306 will pull down lever 303 which thus sets upper

cutting lip 3041 in cooperation with lower cutting lip 3042 to cut the insulating coating and a compressive spring 310 mounted between securing block 306 and twisting lever 311 will push down the twisting lever 311 which thus sets upper twisting piece 4091 in cooperation with lower twisting piece 4092 to grip the work wire to make cutting lips 3041, 3042 to have a neat cut.

A wire stopper 313 is mounted between twisting lever 311 and securing block 314. The distance between a surface 3134 of stopper 313 and the cutting place of cutting lips 3041, 3042 defines the length of the insulating coating of a work wire to be cut. An obstacle 3145 mounted on securing block 314 engages with a groove 3135 of stopper 313 to prevent stopper 313 from escape. A bolt 315 theradedly engages with stopper 313 to adjust the distance between surface 3134 and the cutting place of cutting lips 3041, 3042 to set the length of the insulating coating of a work wire to be cut off. A guiding plate 312 mounted between twisting lever 311 and stopper 313 will help to guide the work wire to be inserted into the work place for being processed.

A conductor twisting means 400 of the present invention, as shown in the left half in Fig. 5, includes an active slide piece 406, two sliding pieces 4071, 4072, two connecting pieces 4081, 4082 and above described twisting pieces 4091, 4092. Two sliding

pieces 4071, 4072 are movably mounted on pieces 1131, 1132 of machine body 2345 in longitudinal direction and engage with the inclined surfaces 4061, 4062 of active slide piece 406 respectively. Two connecting pieces 5 4081, 4082 have ends 4083, 4084 pivoted on back and front pieces 1132, 1131 and with pins 4078, 4078 to pin them and the sliding pieces 4071, 4072 together respectively. The other ends 4085, 4086 of connecting pieces 4081, 4082 engage in two slots 4093, 4094 of 10 twisting pieces 4091, 4092 respectively. Two ends 4063, 4064 of active slide piece 406 are guided by the upper and lower slide guiding seats 4031, 4032 which are secured to pieces 1131, 1132, respectively. Another intermediate follower 402 is mounted between twisting 15 cam 401 and upper guiding seat 4031 on back piece 1132 for smoothly transmitting the cam action. A spring 410 mounted between lower sliding piece 4072 and lower guiding seat 4032 and two springs 411, 412 mounted between connecting pieces 4081, 4082 and pieces 1132, 20 1131 respectively are introduced for urging active slide piece 406, connecting pieces 4081, 4082 to return to their non-actuated positions respectively. The twisting cam 401 is so shaped that the conductors of the work wire are twisted by the relative motion of twisting 25 pieces 4091, 4092 when sliding pieces 4071, 4072 are actuated by inclined surfaces 4061, 4062 of active slide piece 406 and thus actuate connecting pieces 4081, 4082

which in turn set twisting pieces 4091, 4092 in relative motion.

A second cam surface 3011 of cutting cam 301 is provided for lifting movable cutting lip 3041 up a little further for preventing it from scraping the
5 conductors when the twisting pieces 4091, 4092 are executing the twisting action.

A conductor protector 600 of the present invention, as can be found perspectively shown in Fig. 5,
10 also, includes an upper lever 601, a straight piece 602, a compressive spring 603, a lower lever 604 and a tension spring 605. As can be better described with the complementary aid of Fig. 6, upper lever 601 has two lugs 6010 as fulcra pivotally mounted on two holes of
15 front and back pieces 1131, 1132 of machine body 2345. Twisting piece 4092 has an upper groove 4095 within which a front end 3142 of securing block 314 protrudes and the depth of which is larger than the thickness of front end 3142, and a lower groove 4096 to which the
20 front 6041 of lower lever 604 secured therein. Lower lever 604 has two lugs 6040 as fulcra pivotally mounted on two holes of front and back pieces 1131, 1132 of machine body 2345 and tension spring 605 is to urge upwardly lower lever 604. Straight piece 602 vertically
25 guided by guiding block 309 and passing compressive spring 603 has its two ends respectively secured to upper and lower levers 601 & 604. If straight piece 602

is not urged down by twisting cam 401 compressive spring 603 will urge upper lever 601 against twisting cam 401 and thus front 6041 of lower lever 604 will urge down twisting piece 4092 for not to affect the cutting effect of cutting lips 3041, 3042. After cutting the work wire straight piece 602 is urged down by twisting cam 401 and thus tension spring 605 urges up lower lever 604 to lift up twisting piece 4092 to be higher than lower cutting lip 3042 so that the conductors of the work wire are twisted without being harmed. It can be noticed that the exerted strength of tension spring 605 on lower lever 604 preferably is smaller than that of compressive spring 603 on lower lever 604 through the transmission of straight piece 602 for such a purpose. Besides, it is preferable that the exerted strength of compressive spring 310 to urge down conductor twisting lever 311 which is secured thereto twisting piece 4091 is slightly smaller than that of tension spring 605 to urge up twisting piece 4092 so that twisting pieces 4091, 4092 can twist the conductors of the work wire without harming the conductors disregarding any wire gauge of the work wire, which effect is due to the fact that if there exists any retreat most of which will be taken by twisting piece 4091 in such a design.

25 An adjustable tapered piece 404 is mounted between upper guiding seat 4031 and active slide piece 406 to act as a tightness adjusting means. With the

tapered surface 4040 of tapered piece 404, the effective stroke length of active slide piece 406 to follow twisting cam 401 can be varied, i.e. the crevice occupied by tapered piece 404 between upper guiding seat 5 4031 and active slide piece 406 is determined by tapered surface 4040 of tapered piece 404 and is compensated by spring 410. Thus, the effective stroke length of active slide piece 406 to follow twisting cam 401 can be varied and the degree of twisting pieces 4091, 4092 being 10 actuated will be changed accordingly, that is to say, the tightness of the conductors to be twisted is thus selected.

A threaded bolt 405 is used to engage with tapered piece 404 to adjust tapered surface 4040 of 15 tapered piece 404 to define the effective stroke length.

A cut insulating coating disengaging means 500 of the present invention, as shown in Fig. 7, includes a stopping member 503 and a little ridge 502 on cut insulating coating disengaging cam 501 of shaft 11. 20 Stopping member 503 mounted through shaft mounting side 111 of machine body 2345 has an indentation 5030 at one end. A double disk member 504 has a shaft threadedly mounted on shaft mounting side 111 of machine body 2345, the two disk of which have different diameters. The 25 larger disk is geared and there is an annular groove between the two disks. Indentation 5030 of stopping member 503 engages with the rim of the smaller disk, as

shown in Fig. 7A. Stopping member 503 has the other end which frees from engagement with surface 5010 of disengaging cam 501 when twisting pieces 4091, 4092 grip the work wire for cutting lips 3041, 3042 to cut the
5 insulating coating and engages with surface 5011 and the top surface 5012 of disengaging cam to translate machine body 345 a length for causing twisting pieces 4091, 4092 to twist the conductors more effectively as the twisting pieces 4091, 4092 are gripping and twisting the
10 conductors within the cut insulating coating closely near the ends of the conductors now when twisting pieces 4091, 4092 are actuated by twisting cam 401 to twist the conductors. Little ridge 502 is provided on disengaging cam 501 to disengage the cut insulating coating when the
15 conductors have been twisted and thereupon stopping member 503 engages with it to translate machine body 2345 a little more length to disengage the cut insulating coating. As stopping member 503 engages with double disk member 504, the stopping member 503 will
20 have different piercing lengths within machine body 2345 and thus can vary the translation length of machine body 2345 when the threaded shaft of the double disk member is rotated. Besides, slide wheel 3142 provided on shaft mounting side 111 of machine body 2345 is also shown in
25 Fig. 7 and a perspective view of the disengaging cam 501 is shown in Fig. 7B.

The bolt 315 which controls the length of the

insulating coating to be cut and the threaded bolt 405 which defines the effective stroke length of active slide piece 406 to follow twisting cam 401 are mounted through holes 1111, 1112 of shaft mounting side 111 of machine body 2345 respectively.

A cutting lips clearance fine tuning means of the present invention, as shown in Fig. 9, will be illustrated now. The fine tuning rod 305 is rotatably mounted on the machine body 2345, a section of which is shaped to bear a cam surface to have different distances between each of its side surface and the axis of the rod. Thus, each side surface of the cam section of rod 305 will urge up cutting lever 303 somewhat differently to finely setting the clearance between cutting lips 3041, 3042 for cutting the insulating coating of different wire gauge. Tuning rod 305 is mounted a geared disc 3055. A double geared-disc member the smaller geared disc 3056 of which engages with disc 3055 is attached thereto a shaft 3057 rotatably mounted on securing block 306 and the larger geared disc 3058 of which after being adjusted as desired, can be stopped by a wire pin 3059 mounted on machine body 2345. A block 3053 for being screwed thereto the movable cutting lip 3041 to follow cutting lever 303 engages with the cam section of fine tuning rod 305 to urge cutting lever 303 up, as shown in a sectional view of Fig. 9A.

Referring back now to Fig. 2, bolts 315, 405 and

the shaft of double disk member 504 are mounted plate gears 3151, 4051 and 5041 respectively. An adjusting set 16 of the present invention, as shown in Fig. 8, has the three adjusting rings 3152, 4052 and 5042 which
5 respectively are designed to drive the three transmission gears 3153, 4053 and 5043 which in turn engage with plate gears 3051, 4051 and 5041 respectively to make any adjustment which one desires. Adjusting rings 3152, 4052 and 5042 are also designed to be able to
10 drive three pointer 3154, 4054 and 5044 respectively to record the adjustment which one has made for one's reference.

The execution of processing a work wire of the present apparatus is described as follows.

15 A work wire is inserted into the work place to urge against wire stopper 313. Switched on power actuates electromagnetic clutch to drive transmission wheel 17 and thus rotate shaft 11. In the very beginning, wire clamping cam 201 turns to release flange
20 204 of clamping lever 202. Spring 205 urges down clamping lever 202 which in turn sets upper clamping foot 2071 in cooperation with lower clamping foot 2072 to clamp the work wire. Then, Cutting cam 301 turns to disengage with intermediate follower 302 to release
25 cutting lever 303 and to disengage with pressing rod 308 to release twisting lever 311. At this time, compressive spring 310 and tension spring 307 set

twisting pieces 4091, 4092 and cutting lips 3041, 3042 in cooperation to grip and cut the insulating coating of the work wire respectively as described before. Then, stopping member 503 engages with the surface 5011 of
5 disengaging cam 501 to begin to get shaft mounting side 111 to translate the machine body 2345. When stopping member 503 engages top surface 5012 and thus machine body 2345 stops translating, intermediate follower 402 follows twisting cam 401 to press down active slide
10 piece 406 which in turn actuates twisting pieces 4091, 4092 in relative motion through the help of sliding pieces 4071, 4072 and connecting pieces 4081, 4082 as described before to grip and twist the conductors within the cut insulating coating closely near the ends of the
15 conductors and in the interim, second surface 3011 of cutting cam 301 urges against cutting lever 303 to lift up movable cutting lip 3041 a little for preventing it from scraping the conductors when the twisting pieces 4091, 4092 are twisting the conductors.

20 As the twisting action is executed, stopping member 503 engages with little ridge 502 for translating machine body 2345 a little more length to disengage the nearly disengaging cut insulating coating. Now, the processing of a work wire has been performed. Spring
25 110 urges machine body 2345 to return to an end position of shaft 11 when stopping member 503 free from a surface 5010 again. Shaft 11 has revolved a cycle and contact

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breaker 18 contacts micro switch 19 to switch off
electromagnetic clutch when clamping cam 201 and cutting
cam 301 respectively urge clamping lever 202 up and
cutting lever 303 & twisting lever 311 down which in
5 turn lift movable clamping foot 2071 and movable cutting
lip 3041 & upper twisting piece 4091 up respectively.
This apparatus is ready for peeling and twisting an
electric wire having an insulating coating again.

It is to be noted that a certain number of work
10 wires can be put for being processed in this apparatus
without failure, as shown in Fig. 2A.

In addition, a nozzle can be provided near the
cutting and twisting place for blowing off the cut
insulating coating.

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CLAIMS:

1. An apparatus for peeling and twisting an electric wire having an insulating coating characterized in that said apparatus comprises:
 - a machine frame;
 - 5 a shaft rotatably mounted on said frame, having wire clamping cam, insulating coating cutting cam, conductor twisting cam and cut insulating coating disengaging cam and being adapted to be driven by a motor;
 - 10 a wire clamping means mounted on said frame and following said clamping cam;
 - a machine body movably mounted on said shaft and including:
 - an insulating coating cutting means following said.
 - 15 insulating coating cutting cam for cutting said insulating coating of said wire;
 - a conductor twisting means following said conductor twisting cam for twisting the conductors of said wire; and
 - 20 a cut insulating coating disengaging means following said disengaging cam for disengaging the insulating coating which has been cut; and
 - a first elastic member for urging said machine body to an end position on said shaft,
 - 25 wherein the cams of said shaft and their following means are so arranged that they will perform the actions of clamping said wire, cutting said



insulating coating, twisting said conductors and disengaging said cut insulating coating when said shaft has revolved a cycle.

2. An apparatus for peeling and twisting an electric wire according to claim 1, characterized in that said wire clamping means includes:

a clamping lever having a flange and a second elastic element for urging said flange to follow said wire clamping cam and with its one end being pivotally mounted on said frame;

a movable clamping foot mounted on the other end of said clamping lever; and

a fixed clamping foot secured to said frame and in a position opposite to said movable clamping foot

whereby said movable and fixed clamping feet will clamp and release said work wire in due time when said clamping lever follows said wire clamping cam and in turn sets said movable clamping foot in cooperation with said fixed clamping foot to process said wire.

3. An apparatus for peeling and twisting an electric wire according to claim 1 or 2, characterized in that said insulating coating cutting means comprises: an insulating coating cutting lever having a first fulcrum being pivoted on said machine body and being urged against and following said cutting cam of said shaft by a third elastic member;



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- a movable cutting lip mounted on said cutting lever;
and
a fixed cutting lip secured to said machine body and
in a position opposite to said movable cutting lip
5 whereby said cutting lips cut said insulating
coating when said cutting lever follows said cutting
cam and thus in turn sets said movable cutting lip
in cooperation with said fixed cutting lip to cut
10 said insulating coating.
4. an apparatus for peeling and twisting an electric
wire according to claim 3 characterized in that said
apparatus further comprises a wire stopper mounted
inside said machine body and with the distance
15 between one side surface of said stopper and the
cutting place of said cutting lips defining the
length of the insulating coating to be cut.
5. An apparatus for peeling and twisting an electric
wire according to claim 4 characterized in that said
20 apparatus further comprises a bolt threadedly
mounted on said machine body and engaged with said
wire stopper to adjust said distance for setting the
length of the insulating coating to be cut off.
6. An apparatus for peeling and twisting an electric
25 wire according to claim 3, 4 or 5 characterized in
that said apparatus further comprises a fine tuning
means engaged with said cutting lever to finely tune



the clearance between said cutting lips for cutting said insulating coating of different wire gauge.

7. An apparatus for peeling and twisting an electric wire according to claim 6, characterized in that

5 said fine tuning means is a rod rotatably mounted on said machine body, a section of which is shaped to bear a cam surface having different distances between each of its side surface and the axis of said rod and is in engagement with said cutting
10 lever for differently and finely setting said clearance.

8. An apparatus for peeling and twisting an electric wire havig an insulating coating according any one of claims 3-7, characterized in that said apparatus
15 further comprises a first intermediate follower mounted between said cutting cam and said cutting lever for causing said cutting lever smoothly following said cutting cam.

9. An apparatus for peeling and twisting an electric
20 wire according to any one of claims 3-8, characterized in that said cutting cam further includes an additional cam surface to prevent said movable cutting lip from scraping said conductors of said wire by slightly lifting said movable cutting
25 lip up further by said additional cam surface of said cutting cam when said twisting action is executing.



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10. An apparatus for peeling and twisting an electric wire according to any one of claims 1-9, characterized in that said conductor twisting means comprises:
- 5 a first sliding piece having a first hollow central portion and movably mounted on said machine body;
 a second sliding piece having a second hollow central portion and movably mounted on said machine body;
- 10 an active slide piece following said twisting cam and having a first inclined surface to engage with said first hollow central portion and a second inclined surface to engage with said second hollow central portion and in a way to cause said first
- 15 and second sliding pieces in relative motion when said active slide piece follows said twisting cam;
 a wire conductor twisting lever having a second fulcrum being pivoted on said machine body and being urged against and following said cutting cam by
- 20 means of a fourth elastic member mounted on said machine body;
 a first twisting piece movably mounted on said twisting lever and having a first twisting surface;
 a second twisting piece movably mounted on said
- 25 machine body and having a second twisting surface in a position opposite to said first twisting surface of said first twisting piece;

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a first connecting piece engaged with and actuated
by said first sliding piece, having a first end to
engage with said first twisting piece and being
urged against said machine body by a fifth elastic
5 member; and

a second connecting piece engaged with and actuated
by said second sliding piece, having a second end to
engage with said second twisting piece and being
urged against said machine body by a sixth elastic
10 member.

whereby said conductors are twisted by the relative
motion of said twisting pieces when said sliding
pieces are actuated by said inclined surfaces of
said active slide piece and thus actuate said
15 connecting pieces which in turn set said twisting
pieces in relative motion.

11. An apparatus for peeling and twisting an electric
wire according to Claim 10, characterized in that
said apparatus further comprises a conductor
20 protector for lifting up said second twisting piece
to be higher than said fixed cutting lip when said
twisting pieces are in relative motion so that said
conductors can be successfully twisted without being
harmed.

25 12. An apparatus for peeling and twisting an electric
wire having an insulating coating according to Claim
11 characterized in that said conductor protector
comprises:



a seventh elastic member mounted on said machine body;

an upper lever having a third fulcrum being pivoted on said machine body and an end being urged by said seventh elastic member against and following said twisting cam;

an eighth elastic member mounted on said machine body;

a lower lever having a fourth fulcrum being pivoted on said machine body and one end of which is secured to said second twisting piece and urged upwardly by said eighth elastic member; and

a straight piece having its two ends respectively secured to said end of said upper lever and the other end of said lower lever and

said second twisting piece not only is movably mounted on said machine body in its longitudinal direction but also is movably mounted on said machine body in its transverse direction and the

exerted strength of said eighth elastic member on said lower lever is smaller than that of said seventh elastic member on said end of said upper lever and thus in turn on said lower lever through the transmission of said straight piece

whereby when said straight piece is urged down by a cam surface on said twisting cam said eighth elastic member will urge said second twisting piece up to be



higher than said fixed cutting lip for being
cooperated with said first twisting piece to twist
said conductors without harming said conductors.

13. An apparatus for peeling and twisting an electric
5 wire according to claim 12 characterized in that
said fourth elastic member is to urge down said
conductor twisting lever on which the exerted
strength of said fourth elastic member is slightly
smaller than that of said eighth elastic member
10 urging up said second twisting piece so that said
twisting pieces can twist said conductors without
harming said conductors in a work wire of any wire
gauge.

14. An apparatus for peeling and twisting an electric
15 wire according to any one of claims 10-13,
characterized in that said apparatus further
comprises a second intermediate follower mounted
between said twisting cam and said active slide
piece for causing said active slide piece smoothly
20 following said twisting cam.

15. An apparatus for peeling and twisting an electric
wire according to any one of claims 10-14,
characterized in that said apparatus further
comprises a tightness adjusting means mounted
25 between said twisting cam and said active slide piece
for selecting the tightness of said conductors to be
twisted by varying the effective stroke length of



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said active slide piece to follow said twisting cam.

16. An apparatus for peeling and twisting an electric wire according to claim 15, characterized in that said tightness adjusting means is an adjustable tapered piece and with its tapered surface to define said effective stroke length.

17. An apparatus for peeling and twisting an electric wire according to any one of claims 1-16, characterized in that said cut insulating coating disengaging means includes:

a little ridge provided on said disengaging cam; and a stopping member adjustably mounted on said machine body, having an engaging end which can engage with a surface of said disengaging cam and thus can

translates said machine body a length for causing said twisting means to twist said conductors more effectively as said twisting means is twisting said conductors closely near the ends of said conductors and disengaging said cut insulating coating when

said conductors have been twisted and thereupon said stopping member engages with said little ridge of said disengaging cam to translate said machine body a little more length to disengage said cut insulating coating.

18. An apparatus for peeling and twisting an electric wire according to claim 17, characterized in that said disengaging cam has a first surface to engage



with said stopping member for translating said machine body when said twisting means is twisting said conductors and a second surface to free from engaging with said stopping member when said twisting means has completed said twisting.

19. An apparatus for peeling and twisting an electric wire according to claim 17 or 18 characterized in that said apparatus further comprises:

a double disk member the two disks of which have different diameters and the larger disk is geared, having a threaded shaft rotatably mounted on said machine body and having an annular groove between said two disks; and

said stopping member provided with an indentation near the other end of said engaging end to engage with the rim of the smaller disk whereby said stopping member can vary the translation length of said machine body when said threaded shaft is rotated.

20. An apparatus for peeling and twisting an electric wire having an insulating coating substantially as hereinbefore described with reference to the accompanying drawings.