

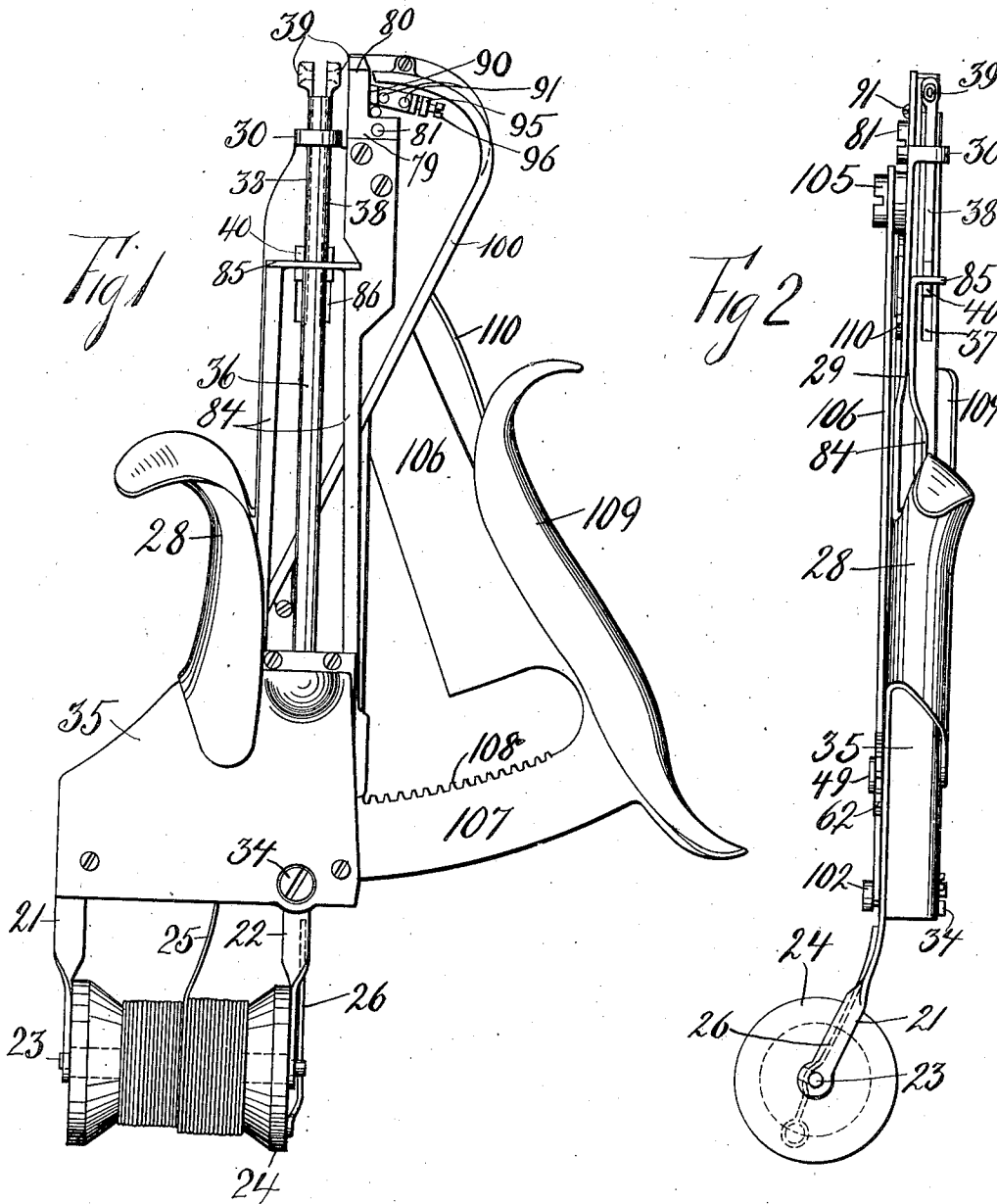
G. L. REICHHELM.
PLIERS.

APPLICATION FILED AUG. 1, 1908. RENEWED JULY 30, 1909.

951,454.

Patented Mar. 8, 1910.

3 SHEETS—SHEET 1.



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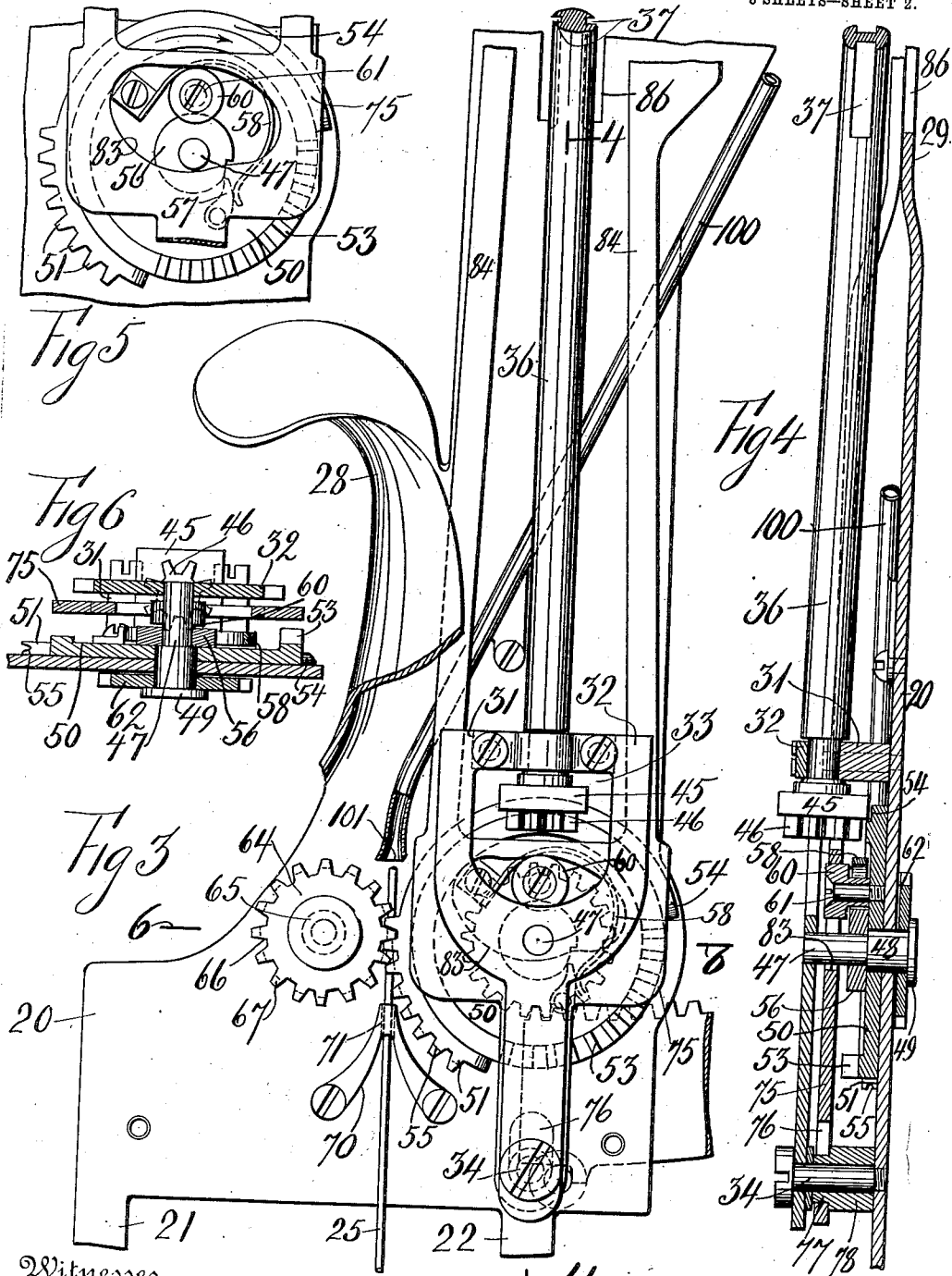
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3 SHEETS—SHEET 2.



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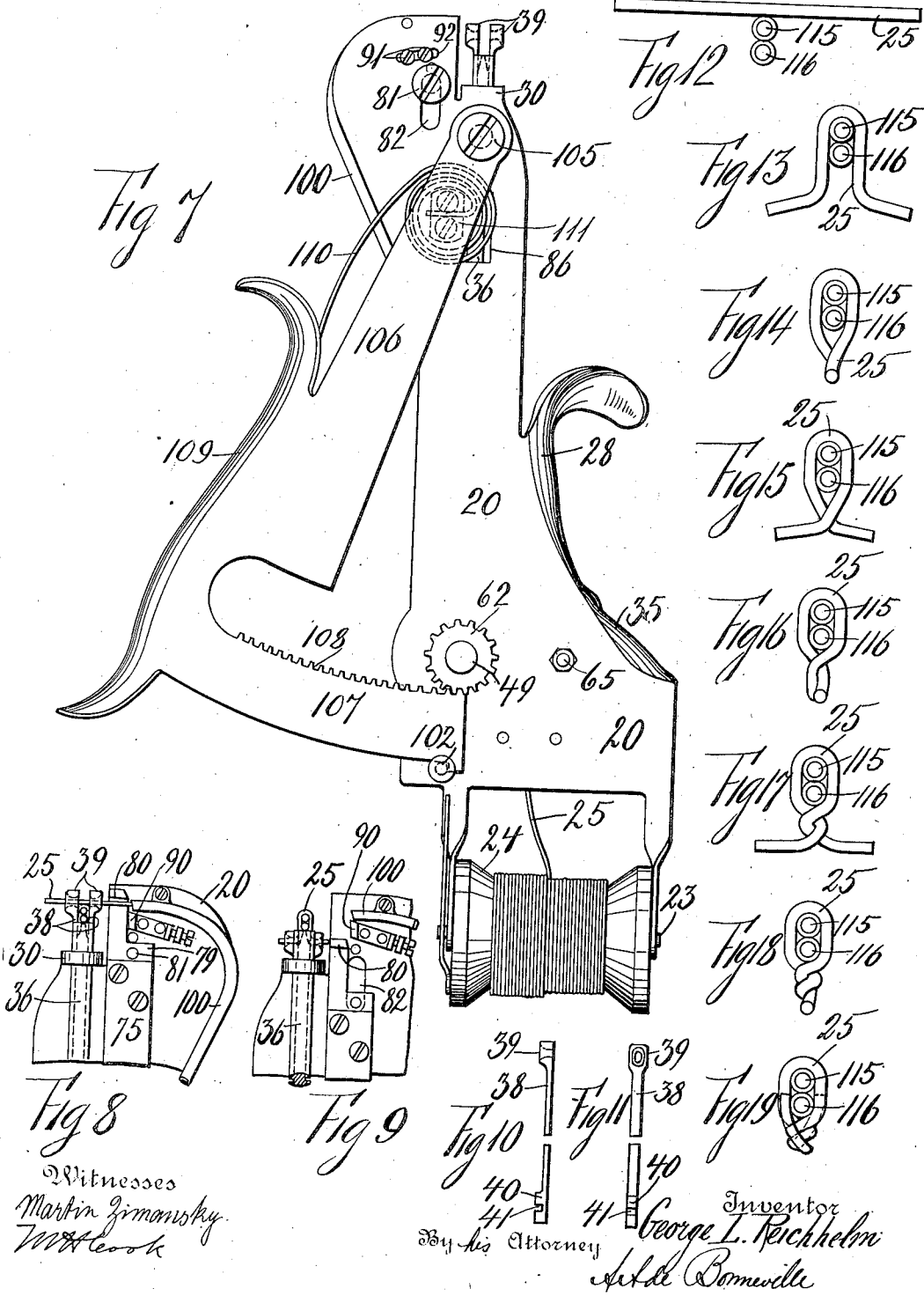
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3 SHEETS—SHEET 3.



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PLIERS.

951,454.

Specification of Letters Patent.

Patented Mar. 8, 1910.

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To all whom it may concern:

Be it known that I, GEORGE L. REICHHELM, a citizen of the United States, and a resident of Jersey City, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Pliers, of which the following is a specification.

This invention relates to twisting and bending pliers. Its object is the production of pliers, by means of which wire can be cut in suitable lengths and with consecutive movements of the operating elements of the invention, bend said lengths into loops and fasten them about a pair of main or body wires to join the latter while the operator presses on an operating lever of the pliers.

The organization of the invention comprises essentially reciprocating and rotating guide jaws for a loop wire, which is caused to be clamped to a pair of body wires located between the said jaws.

Figure 1 represents a front view of a pair of pliers exemplifying the invention, Fig. 2 shows a left hand side view of Fig. 1, Fig. 3 shows an enlarged fragmentary view of Fig. 1 with a cover removed, Fig. 4 represents a section of Fig. 3 on the line 4, 4, Fig. 5 is a fragmentary portion of Fig. 3 with some of the elements removed, Fig. 6 shows a section of Fig. 3 on the line 6, 6, Fig. 7 shows a rear view of Fig. 1, Fig. 8 represents a fragmentary portion of Fig. 1 with the loop wire in the jaws of the pliers, Fig. 9 is a view similar to Fig. 8 with the elements in a changed position, Fig. 10 shows a front view of a guide rod, Fig. 11 is a side view of Fig. 10, Fig. 12 shows an enlarged view of the loop wire after being cut to the proper length, Figs. 13 to 19 show enlarged views of the loop with the main wires or other objects that it binds in the various stages of its formation.

The pliers comprise the base plate or frame 20, from the lower end of which extend the journal arms 21, 22 that engage the spindle 23, and the latter supports the spool 24 carrying the loop wire 25. On the journal arm 22 is fastened spring clamp 26 that bears against one of the edges of the spool 24 and on the surface of the spindle 23, to maintain the two latter in operative position.

From one edge of the frame 20 and at about its central portion is formed the handle 28, and the surface of the upper end of the frame is raised as shown at 29.

At the upper end of the frame 20 and on the front side thereof is located the guide lug 30, and at the lower portion of said frame is located the guide block 31. Over the said guide block is secured at one end the bracket 32 with central opening 33. The said bracket at its lower end is supported on the screw pin 34 extending from frame 20. A cover plate 35 extends over the bracket 32 and is fastened to the frame 20. A guide shaft 36 is journaled in the guide lug 30 and in the guide block 31, the bracket 32 forms a journal bearing with the guide block 31 for said shaft. The upper end of the shaft 36 has two longitudinal grooves 37, in which are located the guide rods 38, with which are formed the funnel shaped guide jaws 39. The rods are sufficiently separated to allow the insertion of a wire and the like between their jaws.

At the lower ends of the guide rods are formed the cross-heads 40 with the grooves 41. At the lower end of the guide shaft 36 is formed the rectangular adjusting lug 45 and from the latter extends the pinion 46. The lug 45 and pinion 46 are located in the opening 33 of the bracket 32.

A pin 47 with the enlarged portion 48 and the collar 49 is journaled in the frame 20 and the bracket 32. On the larger portion of the said pin 47 is journaled a disk 50 having the toothed segment with the teeth 51 extending from its circumferential edge and parallel with the plane of its surface, the toothed segment adjacent thereto with its teeth 53 perpendicular to the plane of its surface, and the cam 54 extending around the circumference thereof between the ends of the said segments. The teeth 51 have the V grooves 55 extending inwardly from their outer ends. On the pin 47 is fastened the one toothed ratchet wheel 56, which is in the path of the pawl 57 pivoted to the disk 50, and a spring 58 attached to the said disk bears against the said pawl. A roller 60 is journaled on the pin 61 extending from said disk 50. A pinion 62 is located on the outer lower side of the frame 20 and is fastened to the larger portion of the pin 47. A pinion 64 is journaled on a pin 65 extending from the frame 20, and its teeth 66 mesh with the teeth 51. The said teeth have V grooves 67 similar to the grooves 55. A wire guide bracket 70 with the guide channel 71 is fastened to the frame 20.

A cam frame generally designated by the

numeral 75, has at its lower end the elongated opening 76 which straddles the smaller portion 77 of a separator 78 supported on the pin 34, and the upper end of the cam frame is connected to the shank 79 of the cutting blade 80. A guide screw pin 81 extends from said shank 79 and engages with an opening 82 in the frame 20.

In the lower portion of the cam frame 75 is formed the cam 83 that engages with the roller 60. With the said cam frame 75 are also formed the legs 84 which are connected by the tie brace 85, that engages the grooves 41 in the cross-heads 40, and an opening 86 in the frame 20 provides clearance for the cross-heads 40.

On the frame 20 is adjustably fastened the cutting blade 90 by means of screws 91 that engage the elongated opening 92 in the frame 20, and are in threaded engagement with openings in the shank of said cutting blade 90. A threaded bracket 95 extends up from the frame 20 and supports the adjusting screw 96 that can bear against the shank of the blade 90.

A guide conduit 100 having the funnel shaped opening 101 for the loop wire 25 is fastened to the frame 20. Its lower opening 101 is located above the pinion 64 and segment with the teeth 51, and is in line with the channel 71 of the guide bracket 70. The conduit 100 extends across the frame below the legs 84 of the guide frame 75, and its upper end takes a direction axial with the openings through the guide jaws 39.

From the rear side of the frame 20 extends the screw pin 105 on which is hinged the operating arm 106 having formed at its lower end the toothed segment 107, the teeth 108 of which mesh with the teeth of the pinion 62. A stop 102 for the segment 107 extends from the frame 20. With the arm 106 is formed the handle 109, and on the inner side of the latter bears a spring 110 which at its other end is wound around and fastened to a block 111 extending from the frame 20.

The invention could be modified in various ways, and rings could be formed with the upper ends of the guide rods 38 in place of the guide jaws 39.

The pliers are shown in their normal position particularly in Figs. 1, 2 and 7, and when starting operations, the arm 106 is swung to approach the lower portion of the frame 20, when the teeth of the segment 107 meshing with the teeth of the pinion 62 causes the latter to be partially turned. The pin 47 turns with the pinion 62, and the ratchet wheel 56 turns with said pin, and after a slight rotation engages the pawl 57, which causes the disk 50 and consequently the pinion 66 meshing with the segment having the teeth 51 to partially turn. The loop wire 25 being in engagement with the

grooves of the teeth of the pinion 66 and with the grooves of the teeth 51, is forced through the guide conduit 100 and from thence through the openings in the guide jaws 39 as shown particularly in Fig. 8. The operator continuing to force the arm 106 a little closer to the frame 20, and the roller 60 engaging with the cam 83 of the cam frame 75, the latter is pulled down carrying with it the cutting blade 80 which severs the loop wire to a proper length for one of the loops to be formed as shown enlarged in Fig. 12. While the wire is being cut the engagement of the tie brace 85, with the cross-heads 40 causes the guide rods 38 to be pulled down, by virtue of which the wire is formed into the U shaped loop over the body wires 115, 116 or other objects as shown in Figs. 9 and 13. While the cam frame 75 is being pulled down, the cam 54 of the disk 50 is engaged with one of the faces of the rectangular adjusting lug 45 and the guide shaft 36 is consequently prevented turning, and locked from rotation. Upon a further approach of the arm 106 to the frame 20, the teeth 53 engaging with the teeth of the pinion 46 causes the guide shaft 36 with its guide rods 38 to be turned one and one-half of a revolution. During the turning of the shaft 36 the engagement of the loop wire 25 with the jaws 39 causes the ends of the said loop to be wound around the body wires 115, 116 and to have its ends finally pushed up to hug the body of the loop. The forms of the loop for the first, second, third and fourth quarter of the first revolution, and the first quarter of the second revolution of the shaft 36 are shown respectively in Figs. 14 to 18. In Fig. 19 is shown the finished loop formed during the second quarter of the second revolution, with the ends of the loop wire hugging the body thereof. Upon the further movement of the arm 106 the teeth 53 are again disengaged from the pinion 46, and the adjusting lug 45 is again in engagement with the cam 54 to prevent the shaft 36 turning, and then the roller 60 coacting with the cam 83, the cam frame 75 with the cutting blade 80, and the guide rods 38 are pushed up to their normal positions for a second operation. Upon releasing the operating arm 106, the spring 110 bearing on the inner face of the handle 109 and the segment 107 coacting with the pinion 62, the pin 47 is turned a revolution in a direction opposite that of the arrow in Fig. 5 and the pawl 57 sliding on the edge of the ratchet wheel 56, the latter is located in its original position.

The invention may be modified by eliminating the operating arm 106 with its segment 107 and rotating the pin 47 by other means. Gearing may be connected with the pinion 62 to render the pliers suitable for connection to a rotary shaft or other means of

transmitting power, especially when they are used for continuous and hard service.

Having described my invention, I claim:

1. With a guide jaw, the combination of means to pull down the jaw, means to lock it from rotation while being pulled down, means to rotate the jaw, the first means raising the jaw after rotation, and the said several means performing their functions in sequence one after the other.
2. The combination of a pair of guide jaws, means to pull down said jaws to bend a loop about an object placed between the jaws, means to rotate the jaws to clamp the loop about said object, the first means laterally forcing the ends of the loop against the body thereof.
3. The combination of a pair of guide jaws for a loop wire, cutting blades adjacent to the jaws, means to pull down the jaws and at the same time operate the cutting blades, to cut the loop wire to proper lengths and bend it over a body wire located between the jaws, and means to turn the jaws to wind the ends of the loop around the body wires, the first means laterally forcing the ends of the loop to hug the body thereof and the body wires.
4. In pliers the combination of a pair of jaws, means to rotate the jaws, means to reciprocate the jaws while being locked from rotation, and cutting blades coacting with the reciprocations of the jaws.
5. In pliers the combination of a frame, an operating arm hinged thereto, a shaft journaled on the frame, a cam frame supported on said frame, connections between the operating arm and the shaft to rotate the latter, and means between the operating arm and the cam frame to reciprocate the same.
6. In pliers the combination of a frame, an operating arm hinged thereto, a shaft journaled on the frame, a guide rod guided on the shaft, a cam frame supported on said frame and connected to the guide rod, connections between the operating arm and the shaft to rotate the latter with the guide rod, and means between the operating arm and the cam frame to reciprocate the latter with the guide rod.
7. In pliers the combination of a frame, an operating arm hinged thereto, a guide shaft journaled on the frame, a guide rod having a guide jaw slidably supported on the guide shaft, a cam frame slidably guided on said frame, connections between the operating arm and the guide shaft to rotate the latter, means between said arm and the cam frame to reciprocate the latter, a cutting blade on the frame, a cutting blade connected to the cam frame, and means to conduct a material between said blades and through the guide jaw, to be bent and wound around a second object placed between the jaws.
8. In a pair of pliers the combination of a frame, an operating arm hinged thereto, a guide shaft journaled on the frame, a pair of guide rods each having a guide jaw slidably supported on the guide shaft, a cam frame slidably guided on said frame, connections between the operating arm and the guide shaft to rotate the latter, means between said arm and the cam frame to reciprocate the latter, cutting blades connected up between the frame and the cam frame, and a guide conduit to lead a wire between said blades and the said guide jaws.
9. In a pair of pliers the combination of a frame, an operating arm hinged thereto, a disk journaled to the frame, a segment with teeth extending perpendicularly therefrom, a toothed segment extending from the circumferential edge of the disk having grooves in the teeth thereof, a cam formed with the face of the disk at the circumferential edge thereof, a guide shaft journaled on the frame, guide rods having jaws slidably supported on the shaft, a rectangular adjusting lug on the shaft in the path of the cam of the disk, a pinion extending from the lug with its teeth in the path of the teeth of the segment having teeth extending perpendicularly from the disk, a pinion having teeth with grooves meshing with the teeth of the segment having grooves in its teeth, connections between the operating arm and the said disk, a roller on the disk, a cam frame guided on the frame with its cam in the path of said roller, a connection between the cam frame and the said guide rods, cutting blades connected up between the frame and the cam frame, and a guide conduit to lead a wire from the grooves of said pinion and said segment having grooves to the cutting blades and to the said guide jaws.
10. In a pair of pliers the combination of a frame, an operating arm hinged to the frame, a spool for wire rotatably supported with the frame, a cam frame slidably supported on the said frame, a guide shaft journaled on the frame, guide rods slidably supported on the shaft, guide jaws with openings at the upper ends of said guide rods, cutting blades connected up between the cam frame and said frame, a disk carried on a pin journaled in the frame, connections between said pin and the operating arm, a segment with teeth having grooves extending from said disk, a pinion journaled on the frame meshing with the teeth of said segment and having grooves in its teeth, a guide conduit to lead a wire from between said grooves to the cutting blades and said openings in the guide jaws.
11. In pliers the combination of a frame, a guide shaft journaled on the frame, a pair of guide rods each having a guide jaw slidably supported on the guide shaft, a cam frame slidably guided on said frame, means

to rotate the guide shaft, means to reciprocate the cam frame, cutting blades connected up between the frame and the cam frame, and means to lead a wire between said blades and said guide jaws.

12. In a plier the combination of a frame, a disk journaled to the frame, means to rotate the disk, a toothed segment on the disk, a cam formed with the disk, a guide shaft journaled on the frame, guide rods having guide jaws slidably supported on the shaft, an adjusting lug connected to the shaft in the path of the cam of the disk, a pinion connected to the shaft with its teeth in the path of the teeth of said segment, a second segment on the disk, having grooves in the teeth thereof, a pinion journaled on the frame with its teeth meshing with the teeth of the second segment, the teeth of this latter pinion having grooves that coact with the grooves in the said segment, a cam frame slidably supported on the frame, and connected to the guide rods, a connection between the disk and cam frame, cutting blades connected up between the frame and the cam frame; and a guide conduit to lead a wire from the grooves of said pinion and said segment to the cutting blades and guide jaws.

13. In pliers the combination of a frame, a disk journaled to the frame, means to rotate the disk, a toothed segment on the disk, a guide shaft journaled on the frame, guide rods with guide jaws slidably supported on the shaft, a pinion on the shaft with its teeth in the path of teeth of said segment, a cam frame slidably supported on the frame and connected to the guide rods, means on the disk to reciprocate the cam frame and means on the shaft coacting with means on the disk to maintain the guide rods in the same axial plane during the reciprocations of the cam frame.

14. In pliers the combination of a frame, a disk journaled thereon, means to rotate the disk, a guide shaft journaled on the frame, guide rods with guide jaws slidably supported on the shaft, a connection between the disk and shaft to rotate the latter, a segment on the disk with grooves in the teeth thereof, a pinion with its teeth in the path of the teeth of the segment and having grooves in its teeth, a cam frame slidably supported on the frame, and connected to the guide rods, means on the disk to reciprocate the cam frame, cutting blades connected up between the frame and cam frame, a spool for wire journaled with the frame, to supply said wire to the said grooves, and a guide conduit in the frame to lead the wire from said groove to the cutting blades and guide jaws.

15. In a device for forming a wire bond

around an object, the combination with two relatively movable members, of mechanisms actuated by the relative movement of said members in one direction to successively measure a predetermined length of wire and secure such measured length of wire around the object.

16. In a device for forming a wire bond around an object, the combination with two relatively movable members, of mechanisms actuated by the relative movement of said members in one direction to successively measure a predetermined length of wire, and sever such measured length of wire around the object.

17. In a device for forming a wire bond around an object the combination with mechanism for measuring a predetermined length of wire, mechanism for securing the measured length of wire around an object, and two relatively movable members operatively connected to and successively actuating said mechanisms upon a relative movement of said members in one direction.

18. In a device for forming a wire bond around an object, the combination with mechanism for bending the wire around the object, mechanism for twisting the wire around the object, and two relatively movable members operatively connected to and automatically successively actuating said mechanisms upon a relative movement of said members.

19. In a device for forming a wire bond around an object, the combination with mechanism for measuring a predetermined length of wire, mechanism for severing the measured length of wire, mechanism for bending the severed length of wire around an object, and two relatively movable members operatively connected to and automatically successively actuating said mechanisms upon a relative movement of said members.

20. In a device for forming a wire bond around an object, the combination with mechanism for measuring a predetermined length of wire, mechanism for severing the measured length of wire, mechanism for bending the severed length of wire around an object, mechanism for twisting the severed length of wire around the object, and two relatively movable members operatively connected to and automatically successively actuating said mechanisms upon a relative movement of said members.

Signed at the borough of Manhattan in the county of New York and State of New York this 29th day of July A. D. 1908.
GEORGE L. REICHEL.

Witnesses:

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AUGUST JOHNSTON.