Aug. 30, 1927. 1,641,077

E. FOUQUET

BINDING AND CUTTING PLIERS

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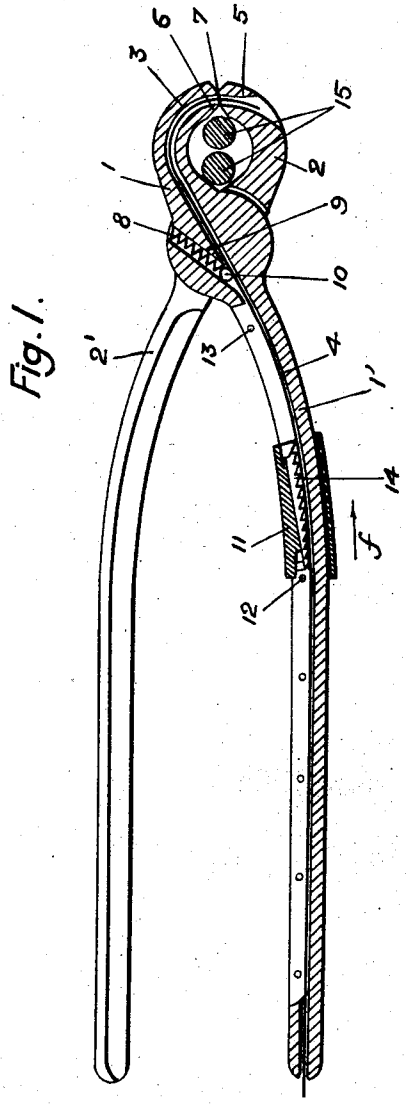

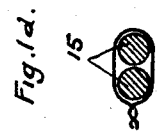

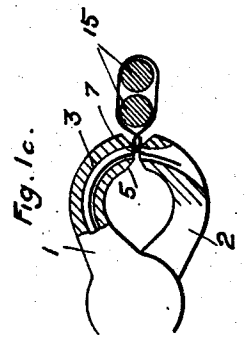

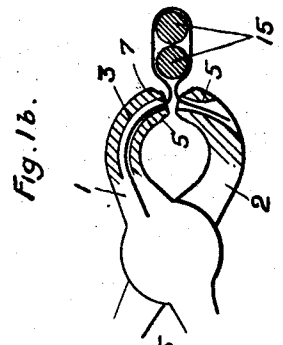

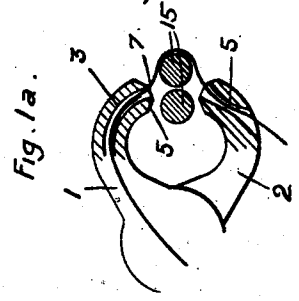

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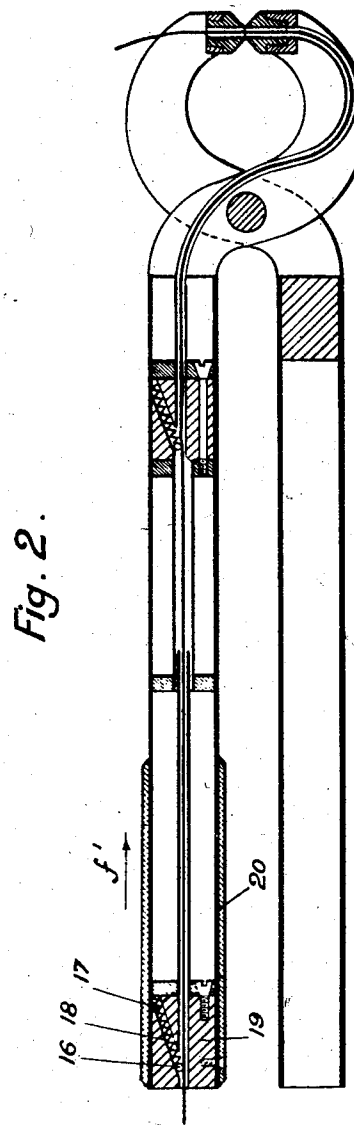

Fig. 2.

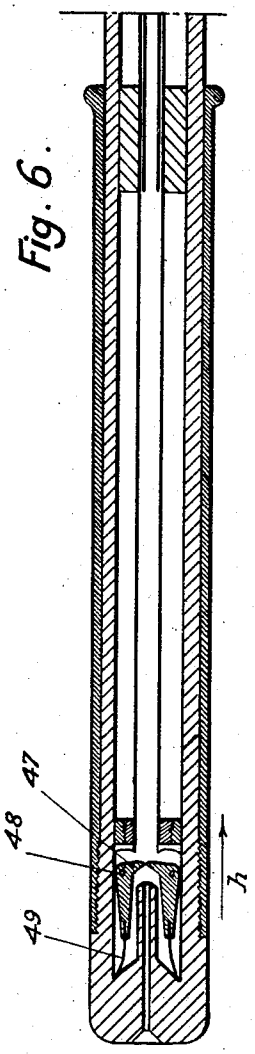

Fig. 6.

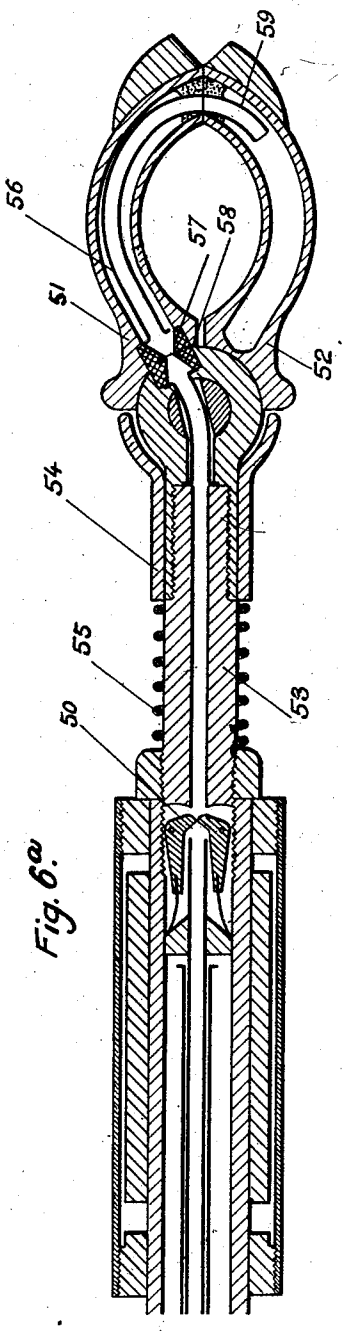

Fig. 6a.

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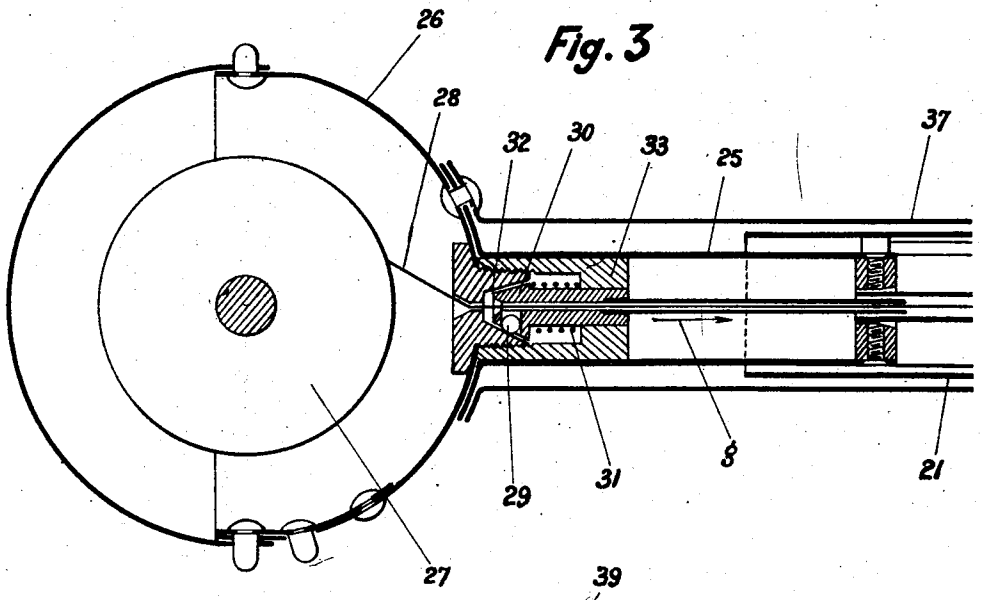
Fig. 3



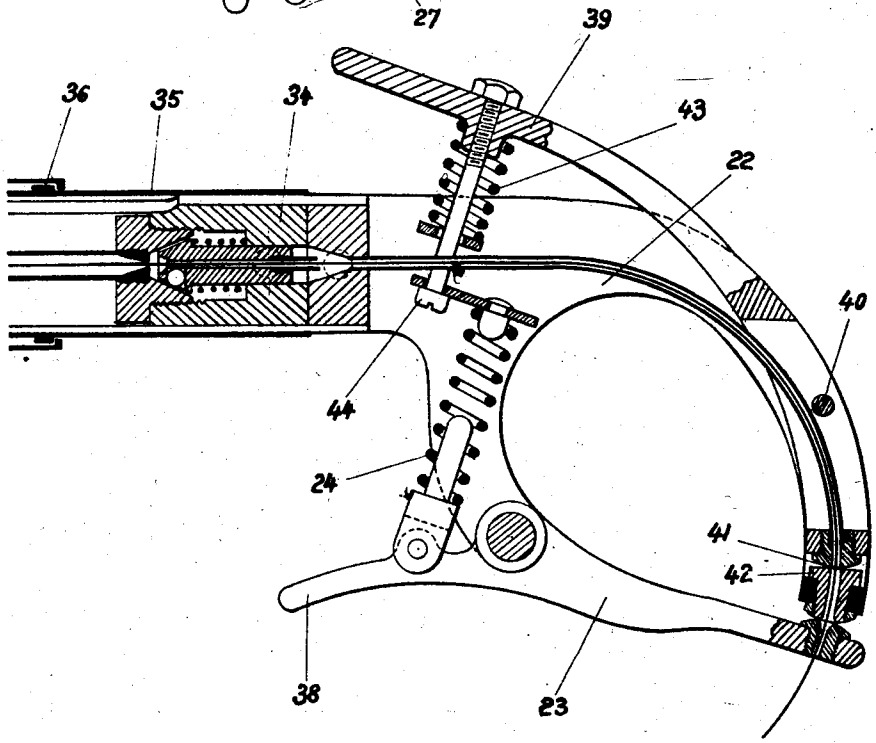


Fig. 3a.

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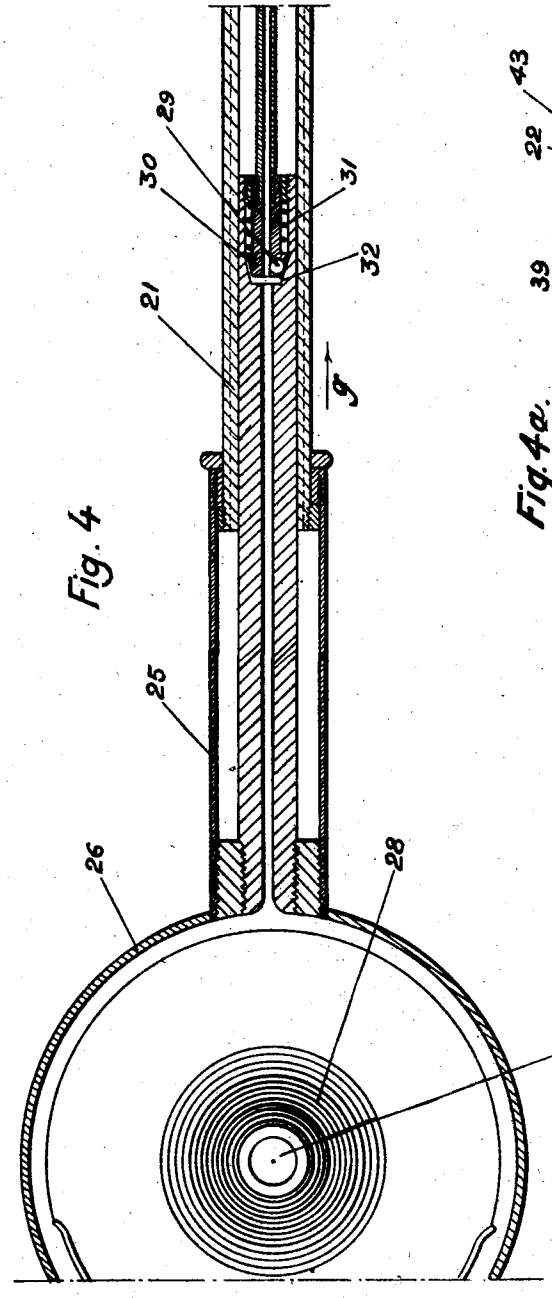

Fig. 4

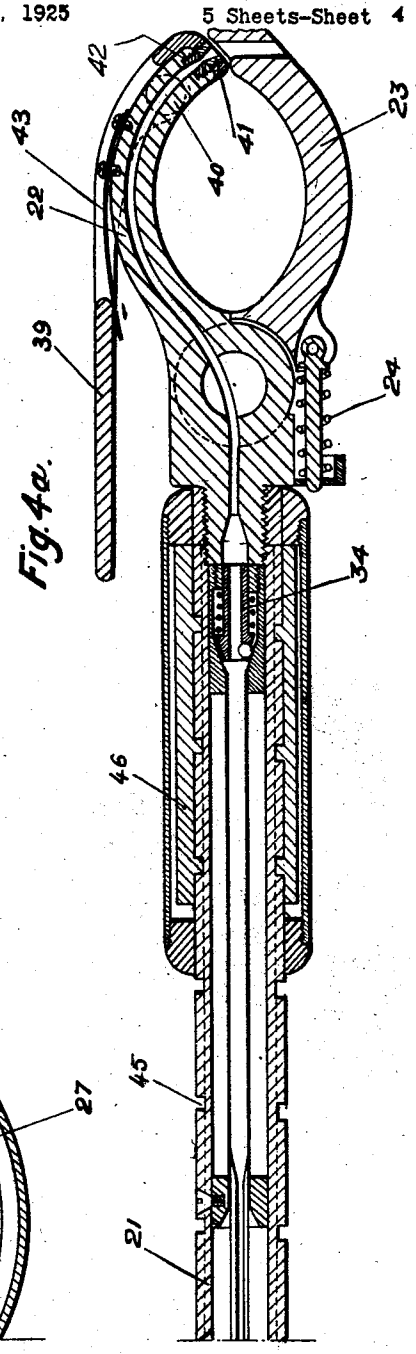

Fig. 4a.

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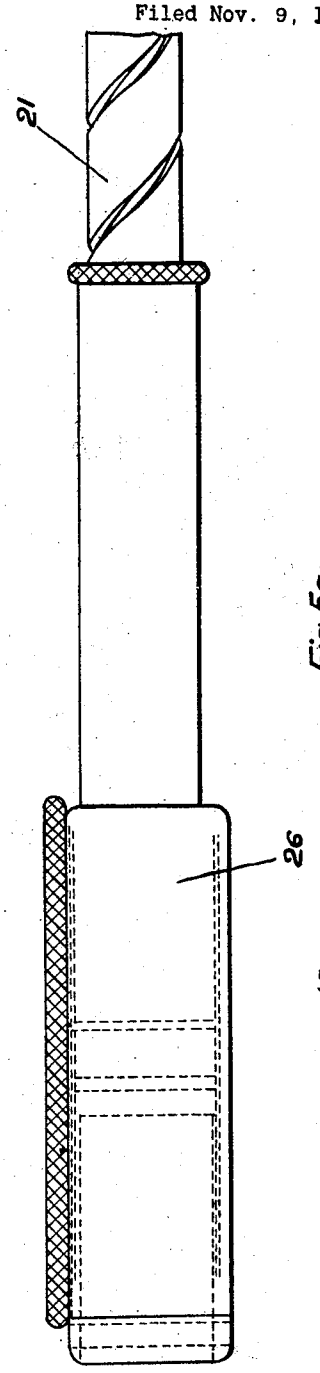

Fig. 5

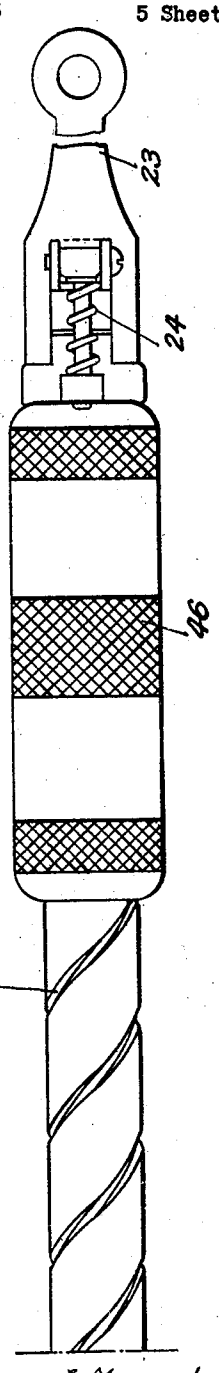

Fig. 5a.

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Patented Aug. 30, 1927. 1,641,077

UNITED STATES PATENT OFFICE.

EUGENE FOUQUET, OF BOIS-COLOMBES, FRANCE.

BINDING AND CUTTING PLIERS.

Application filed November 9, 1925, Serial No. 67,978, and in France November 21, 1924.

My invention relates to pliers allowing wires to be bound together, the bindings thus made to be set and tightened round suitable objects and cut with a minimized expenditure in handicraft. Such pliers are of great advantage for setting up trellis-work or for binding wires in reinforced concrete work.

My invention has for object pliers having two curved jaws one of which is provided with a longitudinal groove or channel wherethrough the wire can be led without any play in one direction only, a blocking device preventing any backward movement. When the pliers are shut over the object to bind, the wire passes beyond the grooved jaw and engages the other jaw. The pliers are then slightly removed and the binding is twisted and then cut off by the cutting device borne by the pliers.

These pliers can be provided with devices which ensure an automatic and practical working.

In some forms of execution the pliers have only one stem bearing the two jaws. This stem can show at one end a box containing a provision of rolled up wire. This box bears a sleeve which can slide over the stem making the wire move along with it. An automatic twisting device makes the stem of the pliers rotate; this device can consist of a sleeve sliding in a helical groove such as is used in wimbles or else the eccentrically disposed stem of the pliers can be adapted to rotate like a hand brace.

The cutting devices according to my invention are of several kinds. They are either provided by the tempered edges of the jaws themselves or else disposed at the end of an independent lever pivoted to one of the jaws, said lever engaging said jaw and urged back by a spring into its non-operative position. When the grooved jaw is pivotally secured to the stem of the pliers, the cutting device can be provided by a sharpened edge of the groove wall cooperating with a sharpened part of the stem, these sharpened parts being afforded by the parts of the stem and of the jaw which slide one upon the other.

A number of devices have also been provided for controlling the movement of the wire in the groove. It may consist in a wedge actuating a toothed part which urges the wire along, or else a spring-urged ball disposed in a groove which is oblique with reference to the wire so that the ball is wedged when the wire moves in one direction and is unwedged when it moves in the reverse direction. The control of the wire can also be affected by a series of balls disposed round the wire in a conical frame which can be wedged inside a conical housing or again by pivoting spring urged clamps which are caused to open when the wire moves in one direction and to close when it moves in the reverse direction.

Several forms of construction, simple and more intricate, of the pliers according to my invention are described hereinbelow by way of example and shown on appended drawings whereof:

Fig. 1 is a cross-section of small pliers as used for securing wirework to wires stretched between poles.

Figs. 1^a, 1^b, 1^c, 1^d show diagrammatically how the pliers work.

Fig. 2 shows similar pliers, a little larger, as used for instance for binding the reinforcement in concrete work.

Figs. 3 and 3^a are longitudinal sections respectively of the rear and of the front part of pliers provided with a box for holding the roll of wire and the jaws of which are adapted to meet at their outer end at a point not in alignment with the stem of the implement.

Figs. 4 and 5 are a longitudinal section and a side view of the rear part of a similar tool.

Figs. 4^a and 5^a are similar views of the front part of the same tool wherein the jaws are adapted to meet at their outer end at a point in alignment with the stem of the implement.

Figs. 6 and 6^a are longitudinal sections respectively of the rear and of the front part of a different form of execution of a wire twisting tool.

Referring to Fig. 1, the pliers comprise two jaws 1, 2 pivotally secured one to the other and disposed at the end of the arms 1′, 2′. The jaw 1 and the arm 1′ are provided with a longitudinal groove or channel 3 wherethrough the wire 4 can move. The jaw 2 shows a hole 5; the respective edges 6 and 7 of the two jaws are tempered so as to serve for cutting the wire. The blocking device comprises a spring 8 disposed in a groove 9 and urging the ball 10 obliquely against the wire 4. The device which controls the movement of the wire consists of

a wedge 11 which can move between the stops 12, 13. The slanting side of this wedge pushes the toothed part 14 so as to make it catch in the wire 4 when the wedge 11 is pushed in the direction of the arrow *f*.

The pliers work in the following manner: The wire 4 being passed through the groove 3 for instance until it arrives against the edge 6 of the jaw, the pliers are disposed (Fig. 1) over the rods 15 which are to be bound together, the wedge 11 being pushed in the direction of the arrow *f*. The wedging of the said wedge 11 makes the toothed part 14 and thereby the wire 4 advance. When the wedge 11 has come against its stop 13, it is brought back again. During this backward movement it does not carry the wire back with it, on one hand because the wedge 11 actuating the toothed part 14 is unwedged and secondly because of the action of the blocking ball 10. Thus the wire 4 protrudes by an important length beyond the jaw 1 and passes through the hole 5 of the jaw 2. The jaws of the pliers are then opened (Fig. 1[a]) and moved backwards so as to slide along the wire. Once rods 15 have been passed (Fig. 1[b]) the pliers are slightly closed without being tightened over the wire. The pliers are then rotated (Fig. 1[c]) so as to twist and to tighten the binding. Lastly (Fig. 1[d]) the two jaws are closed tightly over the wire so as to make the edges 6, 7 cut the binding which is thereby finished, whilst the pliers are ready for making another binding.

In a general manner, the pliers shown on Fig. 2 work exactly like the pliers shown on Fig. 1. The main difference resides in the device for moving the wire forward which comprises like the blocking device a ball 16 urged by a spring 17 against the wire. The spring 17 is disposed in a groove 18 provided in a head 19 secured to a sleeve 20 sliding over the corresponding arm of the pliers. The movement of the sleeve 20 in the direction of the arrow *f'*, will evidently wedge the ball against the wire, the reverse movement unwedging it.

In the pliers shown on Figs. 3 and 3[a] the two arms are replaced by one only stem 21 cast with one of the jaws 22 whilst the other jaw 23 is pivoted to the stem; the closing of the pliers is ensured by a spring 24 which urges the jaw 23 tightly against the jaw 22. Over the end of the stem 21 is mounted a sleeve 25 which can slide along the said stem. To the sleeve is secured a box 26 containing a spool 27 round which a supply of wire 28 is rolled. The movement of the wire is controlled by three balls 29 disposed at 120° one from the other round the wire and one of which only is shown on Fig. 3. These balls are disposed in a conical frame 30 urged by the spring 31 into a conical housing 32 screwed on the end of the box 33 and secured to the sleeve 25. It is easy to see that the balls 29 cannot prevent the wire from advancing in the direction of the arrow *g* as this motion of the wire would unwedge the balls. Reversely the balls will prevent the inertia of spool 28 from urging the wire back as this would wedge the balls into the conical recess 32. The supplementary blocking device 34 is built like the just described controlling device.

The stem 21 and the jaw 22 are constituted by two stamped metal sheets and are provided with a tubular casing 35 showing a projection 36. This projection acts as a stop for the tubular handle 37 when latter is moved backwards. In view of facilitating the opening of the pliers, the jaw 23 is provided with a lever 38 which can be actuated by the forefinger of the hand holding the handle.

In these pliers, the wire is twisted by the mere rotation of the tool instead of by hand. For this purpose the stem 21 is not in alignment with the outer end of the jaws so that the binding may be twisted by rotating the tool round a line joining the outer end of the closed jaws with the end of the stem which is the farthest from the jaws. In the pliers as shown on Figs. 3 and 3[a], the wire is cut by an auxiliary lever 39 pivotally secured to the jaw 22 at 40 and cutting edge 41 of which comes against the cutting edge 42 of the jaw (these cutting edges are shown on drawing as provided on special tempered steel parts). A spring 43 holds normally the lever 39 in its non-operative position adjusted by means of the screw 44. It is easy to see that the working of the pliers is very similar to that of the tool shown on Fig. 1 but much simpler. The pliers are held by their tubular handle 37 and the jaws are opened by the forefinger actuating the lever 38. The parts to be bound are passed between the jaws whereupon the lever 38 being released, the pliers are closed. The wire is caused to advance by the required length through a suitable number of to and fro motions of the tubular handle 37 which draws along in its operative direction the balls 29 and makes the wire advance. The jaws are then again reopened and the parts to be bound now partially surrounded by the wire pass out of the said jaws. The stem is then rotated so as to tighten the binding, after which the wire is cut by the lever 39. The pliers are easily removed by actuating at the same time the lever 38.

The pliers allow a very short binding to be made which is broken off near the third winding. In view of this it is sufficient to bend over slightly the wire projecting beyond the jaw 23 just before the wire is twisted. It cannot slip any more and the wire breaks off automatically.

The pliers shown on Figs. 4, 4[a], 5, and 5[a]

are quite similar to the one just described and differ only by the twisting device which comprises a helical groove 45 provided on the stem 21 and cooperating with a nut 46, this device being similar to and working like the sleeve of a wimble.

The pliers shown on Figs. 6 and 6ª are automatic like those shown on Figs. 4 and 5. The difference with latter lies mainly in the advance and cutting devices. The advance device comprises the clamps 47 pivoted at 48 and urged back into their closing position by the springs 49. The wire is held tightly between the ends of the said clamps. Evidently if the sleeve is pulled in the direction of the arrow *h* the wire held by the clamps 47 will be drawn along and will not be allowed to move backwards because latter movement would increase the hold of the clamps on the wire. As shown, the blocking device 50 is similar to the advance device. In these pliers both jaws 51 and 52 are pivotally secured to the stem 53. They are closed by means of a sleeve 54 urged by the spring 55. In the part where a pivoting surface of the jaw 51 slides along a pivoting surface of the stem 53 the groove 56 shows sharp edges 57 which can engage the sharp edges 58 of the part of the groove provided in the stationary part of the pliers. It is easy to see that the opening or the closing of the pliers will automatically make the sharp edges 57 move with reference to the sharp edges 58 and thereby cut the wire. It should be noted that in the pliers shown the groove 56 is continued in 59 in the other jaw 52. Latter jaw has been thus recessed in order to let the end of the wire enter it.

Except the automatic cutting, the last described pliers work exactly like those shown on Figs. 4, 4ª, 5, and 5ª.

What I claim is:

1. In a wire working tool the combination of a channelled wire receiving jaw, the channel in the said jaw having a diameter very slightly superior to that of the wire, of a stem bearing the channelled jaw and provided with a longitudinal narrow wire receiving channel continuing that of the said channelled jaw of a second jaw recessed at its outer end and cooperating with the channelled jaw by closing over the parts to bind, of a box communicating with the rear of the channel in the stem, for receiving a roll of wire, of a device adapted to cut the wire at the end of the first named jaw, of a blocking device preventing any undesirable rearward motion of the wire and of means whereby the forward motion of the box causes the wire to advance.

2. In a wire working tool as claimed in claim 1, means whereby the wire-holding box is slidably secured to the rear of the channelled stem.

3. In a wire working tool the combination of a channelled wire receiving jaw, the channel in the said jaw having a diameter very slightly superior to that of the wire, of a stem to which is rigidly secured the channelled jaw and provided with a longitudinal narrow wire receiving channel continuing that of the said channelled jaw, of a second jaw recessed at its outer end and pivotally secured to the stem and the outer end of which is adapted to meet the outer end of the channelled jaw at a point which is not in alignment with the axis of the stem, of a box communicating with the rear of the channel in the stem for receiving a roll of wire, of a device adapted to cut the wire as it issues out of the jaw, of a blocking device preventing any undesirable rearward motion of the wire and of means whereby the forward motion of the box causes the wire to advance.

4. In a wire working tool as claimed in claim 1, a sleeve sliding over the stem and to the rear of which is secured the wire containing box, a rearwardly conically recessed part secured inside the sleeve, a rearwardly conical frame secured inside said recessed part and a series of balls in said frame frictionally disposed round the wire.

5. In a wire working tool as claimed in claim 1, a sleeve sliding over the stem, and to the rear of which is secured the wire containing box, a rearwardly conically recessed part secured inside the sleeve, a rearwardly conical frame secured inside said recessed part, a series of balls in said frame frictionally disposed round the wire and said blocking device comprising a second series of balls disposed round the wire, a conical frame wherein the last mentioned balls are lodged and a conically recessed part at the rear side of last mentioned frame and secured inside the stem.

6. In a wire working tool as claimed in claim 1, a sleeve sliding over the stem, to the rear of which is secured the wire containing box and adapted to draw the wire along with it, a tubular handle disposed round the stem and over the sleeve and the rear part of which is secured to the box, a projection on the stem acting as a stop for said handle and a spring urging the recessed jaw pivotally secured to the stem.

In testimony whereof I affix my signature.

EUGENE FOUQUET.