

March 22, 1960

G. E. CHRISTIN

2,929,069

TOOLS FOR SECURING WIRES TOGETHER BY MEANS OF DEFORMABLE CLIPS

Filed April 19, 1957

3 Sheets-Sheet 1

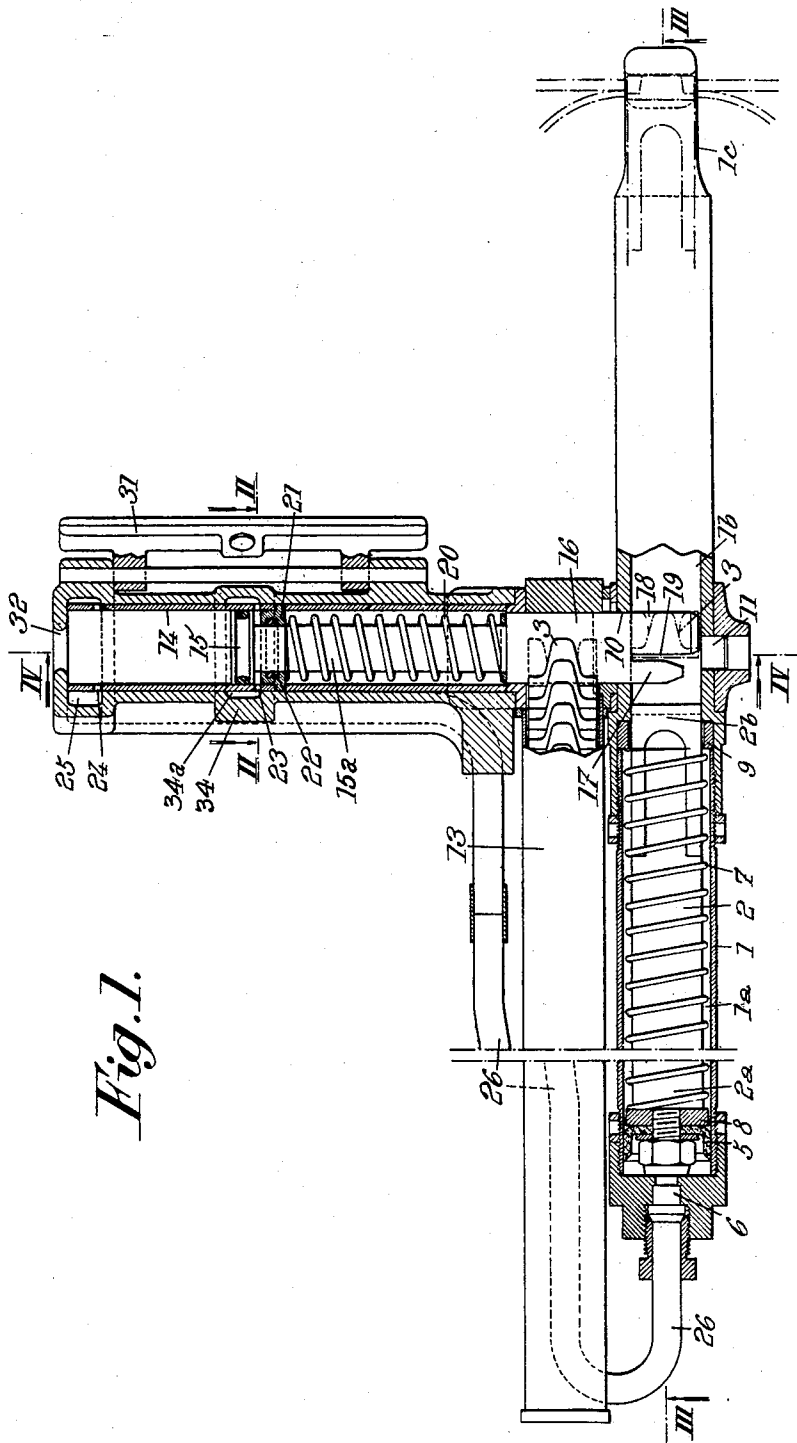


Fig. 1.

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Fig. 2.

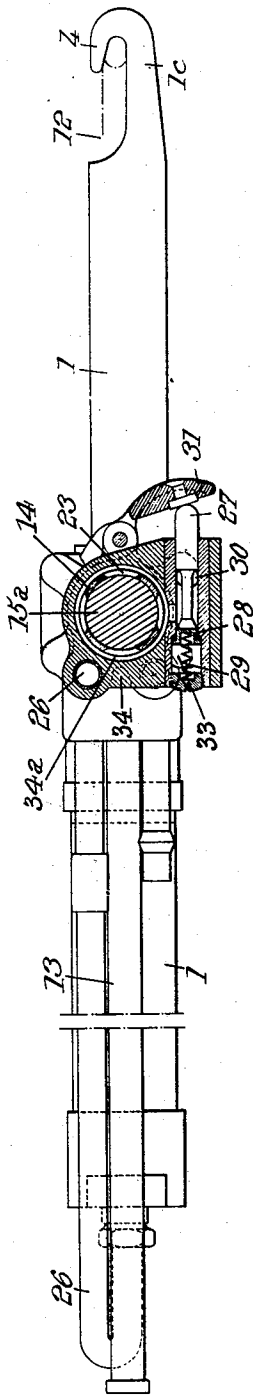


Fig. 3.

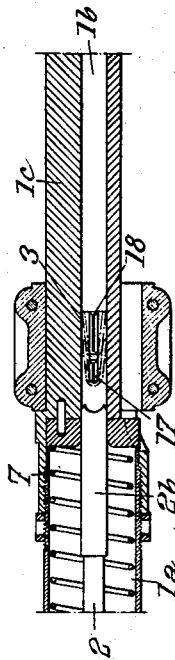
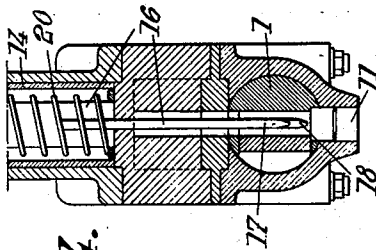


Fig. 4.



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Fig. 5.

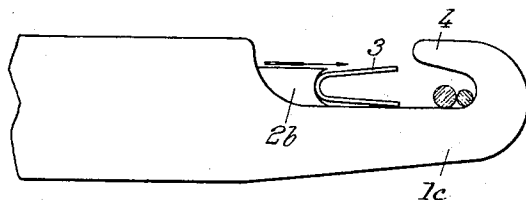


Fig. 6.

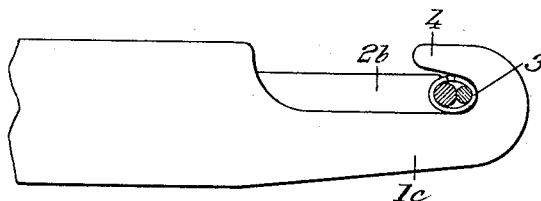


Fig. 7.

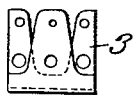
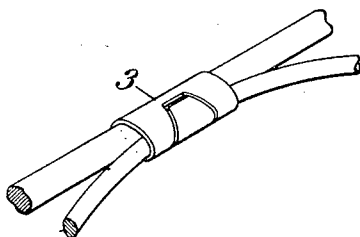


Fig. 8.



Fig. 9.



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TOOLS FOR SECURING WIRES TOGETHER BY MEANS OF DEFORMABLE CLIPS

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Application April 19, 1957, Serial No. 653,935

Claims priority, application France April 24, 1956

2 Claims. (Cl. 1—187)

My invention relates to tools for securing parallel wires together by wrapping around them a clip made of a thin deformable plate initially bent in substantially U-shape.

My invention is concerned with a tool of this kind including an elongated tube provided with an inner longitudinal guiding passage for said clips, said tube being provided with a transverse inlet opening leading to one end of said passage, the other end thereof forming an outlet located opposite the inner wall of a hook integral with said tube and adapted to be engaged about the wires to be secured together. Means are provided for inserting a clip into said passage through said inlet opening. A plunger slidable in said passage is driven through suitable means to push said clip through said passage past said outlet so that the branches of this U-shaped clip are bent along the inner surface of said hook and wrapped around the wires engaged by said nose.

The chief object of my invention is to provide a tool of this kind which is better adapted to meet the requirements of practice than those used for the same purpose up to this time in particular from the point of view of safety of operation.

For this purpose, according to my invention, the tool includes compressed fluid means for suddenly throwing said plunger through said passage toward said outlet, a feed circuit for said compressed fluid means, a magazine mounted along said tube and having an outlet opposite said inlet opening, said magazine being adapted to contain a multiplicity of juxtaposed clips, a push-piece movably mounted with respect to said tube transversely thereto capable of moving into said passage through said inlet opening for feeding said clips from said magazine into said passage, and a safety valve operatively connected with said push-piece to cut off said feed circuit from said compressed fluid means as long as said push-piece is engaged in said passage.

A preferred embodiment of the present invention will be hereinafter described with reference to the accompanying drawings, given merely by way of example and in which:

Fig. 1 is an elevational view, with portions cut away, of a tool made according to said embodiment of the invention.

Fig. 2 is a sectional view on the line II—II of Fig. 1.

Fig. 3 is a sectional view, on the line III—III of Fig. 1, of a portion of the tool of Fig. 1.

Fig. 4 is a sectional view, on the line IV—IV of Fig. 1, of a portion of the tool of Fig. 1.

Fig. 5 is a plan view on an enlarged scale of the end of the tool, such as it is immediately before the end of a wire securing operation.

Fig. 6 is a view similar to Fig. 5 showing the end of the operation.

Fig. 7 is a plan view of a clip to be used with the tool according to my invention.

Fig. 8 is a side view corresponding to Fig. 7.

Fig. 9 is a perspective view showing the assembly of

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two wires by means of a clip fitted by means of the tool according to my invention.

The tool which will be described with reference to the drawings is intended to wrap a clip around two wires extending in substantially parallel direction.

This tool includes a tube 1 in which a plunger 2 is movable.

Tube 1 comprises an elongated slender, hollow circular portion 1_a and an extension having a passage 1_b with an inner cross section which corresponds to the shape of clip 3.

Plunger 2 is constituted by a head 2_a of circular cross section rigid with a rod of substantially rectangular cross section provided at its end with a push member 2_b adapted to fit on a clip 3, the cross section of said member 2_b being substantially the same as that of passage 1_b.

One of the walls 1_c of passage 1_b is extended beyond the outlet of this passage and is bent so as to form a hook 4 (Fig. 2). A relatively large space 12 (averaging several centimeters) is provided between the end of this hook and said outlet.

In order to drive plunger 2 through passage 1_b, I make use of the kinetic energy supplied by the sudden expansion of a fluid under pressure which will be hereinafter supposed to be compressed air.

The head 2_a of the plunger carries a packing member 5 adapted to be applied in fluidtight fashion against the inner wall of cylinder 1_a by the compressed air pressure and an air inlet orifice 6 is provided in the end wall of said cylinder 1_a.

Resilient means are provided for returning plunger 2 into its position of rest, said means consisting of a compression spring 7 wound around said plunger 2. One end of said spring bears against a shoulder 8, carried by the head of plunger 2, and the other end of the spring bears against an annular surface 9 applied against the inlet of passage 1_b.

The clips 3 are fed into passage 1_b through an inlet opening 10 formed transversely in the wall of tube 1, at the inlet end of passage 1_b, so that plunger 2 can transmit its movement to each of said clips as soon as the plunger is started into movement.

It will be supposed that the clips are introduced into passage 1_b at a great distance from its outlet. This arrangement and the fact that the end portion of tube 1 is of a small cross section permit of introducing the tool at a relatively great distance into narrow spaces and to reach with hook 4 points which are difficult of access, which is particularly interesting, for instance, when the wires to be assembled together belong to a spring cushion structure including a great number of elements assembled together.

At the place where the clip is introduced into the hollow rod, I provide means for temporarily holding the clip in position and in particular for preventing it from moving under the effect of gravity in passage 1_b or opening 10 when the tool is being handled. Such means consist, in the example shown by the drawing, of a permanent magnet 11, the clips being supposed to be made of a magnetic or magnetizable material, such as soft steel.

The clip 3 to be deformed is already in a bent state when introduced into the tool and it includes at least one portion substantially parallel to the axis of tube 1. The profile of this clip is that of a slightly open U and the two portions respectively forming the branches are complementary of each other so that the projecting portions of one of these branches can engage in the notch of the other, which is of corresponding shape, as visible on Figs. 7 and 8.

The branches of every clip, when it has been introduced into passage 1_b, extend toward the outlet of this passage.

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The operation of the tool according to my invention is as follows.

Initially, spring 7 is not compressed. The head of plunger 2 is applied against the rear end face of tube 1 and the push member portion 2_b of said plunger is located at a small distance from the back of the clip 3 already introduced in passage 1_b.

Hook 4 is then engaged on the wires to be assembled together.

When the plunger 2 is projected through the tube under the effect of a sudden expansion of compressed air, push member 2_b pushes clip 3 away from magnet 11, and projects it violently into hook 4 (Fig. 5). The end position of plunger 2 is shown in dot and dash lines on Figs. 1 and 2.

The smooth walls of the inner surface of hook 4 cause the wings of clip 3 to bend and to become wrapped around the wires to be assembled together, as shown by Figs. 6 and 9.

During the movement of plunger 2, spring 7 has been compressed; as soon as the compressed air is allowed to escape, the expansion of this spring returns mass 2 to its initial position.

The tool is automatically fed with clips from a reserve constituted by a kind of stick formed by said clips which are juxtaposed in overlapping relation to one another.

For this purpose, the clips are advantageously of the kind described and illustrated in my U.S. patent application Ser. No. 645,341, filed on March 11, 1957, for "Improvements in clips for binding together elements of elongated shape." Such clips are provided on the inner and outer surfaces of their branches with partitions and recesses arranged to cooperate with corresponding recesses and projections of similar juxtaposed clips so that a plurality of clips mounted in juxtaposition and overlapping one another form a kind of stick the elements of which can easily be detached from said stick.

The passage 1_b of the tool is successively fed with clips by means of a finger controlled by a safety device which prevents the plunger from being driven by compressed air as long as said finger is engaged in said passage for introducing a clip thereinto.

For this purpose, the compressed air circuit 26 is controlled by means of a valve which connects this feed circuit 26 with the inlet orifice 6 of cylinder 1_a only when the above mentioned finger 16 is on the outside of the hollow rod.

The stick formed by clips 3 is housed in a magazine 13 extending in a direction parallel to the axis of rod 1. If, as it is usually the case, the tool is to be used in inclined position, hook 4 being at the lower end, the stick of clips is urged by gravity toward the outlet of the magazine.

The tool is provided, opposite the opening 10 through which the clips are introduced into passage 1_b, with a hollow cylinder 14 substantially perpendicular to the axis of rod 1 and in which a piston 15 is reciprocable.

The rod 15_a of piston 15 carries a push-piece for driving the clip into passage 1_b. This push-piece includes a head 16 and two teeth 17, 18, the width of the slot 19 between these two teeth being substantially equal to the thickness of a clip.

Tooth 17 is wedge-shaped so that when it is driven between two consecutive clips of the stick located in magazine 13, it drives said two clips away from each other, the clip that is detached from the stick being positively driven toward passage 1_b when the bottom of slot 19 comes into contact with said clip.

A compression spring 20 wound on piston rod 15_a urges push-piece 17, 18 toward the passage 1_b. For this purpose, one end of spring 20 is applied against the push-piece 17, 18 and the other end is applied against a shoulder 21 formed in the middle part of the inner wall of cylinder 14 a packing ring 22 being provided between this shoulder 21 and rod 16.

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Cylinder 14 is surrounded by a casing 34.

At the level of the lowest position of piston 15 (position shown by Fig. 1), casing 34 forms, around cylinder 14, an annular chamber 34_a.

This annular chamber 34_a communicates through ports 23 with the annular space between piston rod 15_a and cylinder 14, this annular space being limited at the top by piston 15 itself and at the bottom thereof with an together with its packing member 22.

As shown by Fig. 2, a valve 28 carried by a rod 27 adapted to be pushed by a pivoting member 31 mounted on casing 34 is capable, when pushed inwardly against the action of a spring 29, of placing said annular chamber 34_a in communication with an air feed conduit 33, connected with any suitable source of compressed air. At the top of cylinder 14, the wall of this cylinder is provided with ports connecting the inside thereof with an annular chamber 25 in communication with the compressed air conduit 26.

This device works as follows.

Initially, spring 20 has pushed piece 17, 18 into passage 1_b for introduction of a clip 3.

When member 31 is pivoted to open valve 28, compressed air flows from the intake 33 into annular chamber 34_a and then through ports 23 into the annular space under piston 15, thus pushing said piston upwardly.

Push-piece 17, 18 is thus retracted from passage 1_b.

When piston 15 comes at the top of its upward stroke, that is to say passes above ports 24, the annular space between piston rod 15 and cylinder 14, which is still fed with air under pressure, now communicates through ports 24 with chamber 25 and conduit 26 so that plunger 2 is driven toward the right to project a clip 3 into hook 4.

It will be seen that when piston 15 comes into this position, push-piece 17, 18 has already been retracted from passage 1_b.

In a general manner, while I have, in the above description, disclosed what I deem to be practical and efficient embodiments of my invention, it should be well understood that I do not wish to be limited thereto as there might be changes made in the arrangement, disposition and form of the parts without departing from the principle of the present invention as comprehended within the scope of the accompanying claims.

What I claim is:

1. A tool for wrapping around substantially parallel wires to be secured together a clip made of a thin deformable plate initially bent in substantially U shape, which tool comprises in combination an elongated tube provided with a longitudinal guiding passage therein, one end of said passage being open to form an outlet, said tube including an end portion forming an extension of one wall of said passage beyond said outlet, said extension being bent to form a hook the inner wall of which is located opposite said passage outlet, said hook being adapted to be engaged around said wires to be secured together, said tube being provided, at a distance from said outlet, with a transverse inlet opening to permit introduction into said passage of such a U bent clip, with the branches thereof extending toward said nose, a plunger slidable in said passage for pushing said clip thus inserted in said rod through said passage toward said hook, whereby the branches of said clip are deformed along the inner surface of said hook and wrapped around the wires located in said hook, compressed fluid means for moving said plunger through said passage toward said outlet, a feed circuit for said compressed fluid means, a magazine mounted along said tube and having an outlet opposite said inlet opening, said magazine being adapted to contain a multiplicity of juxtaposed clips, a feed element transversely movable into said passage through said inlet opening for feeding said clips from said magazine into said passage, and a valve operatively connected with said feed element to cut off said feed circuit from

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said compressed fluid means as long as said feed element is in said passage.

2. A tool according to claim 1, said clips being juxtaposed in overlapping relation to one another to form a stick and said feed element having two portions with a gap of a thickness equal to that of a clip therebetween, one of said portions being wedge-shaped whereby when moved transversely to said magazine the lower clip of said stick is fed into said passage.

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