

March 3, 1936.

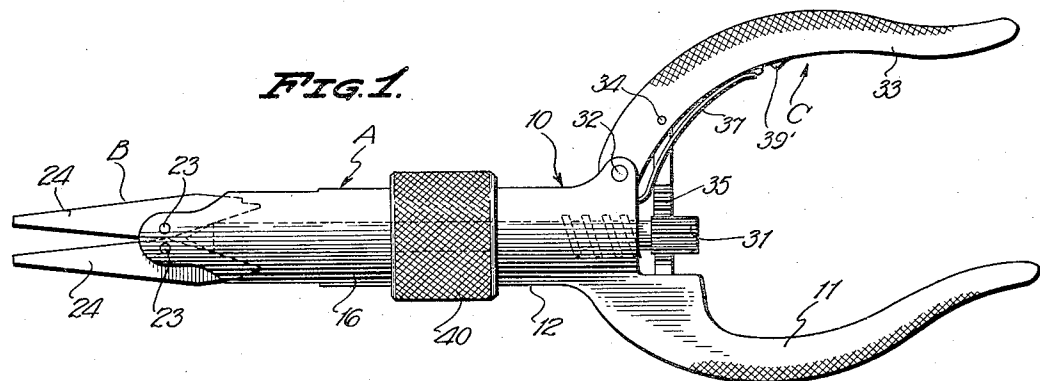
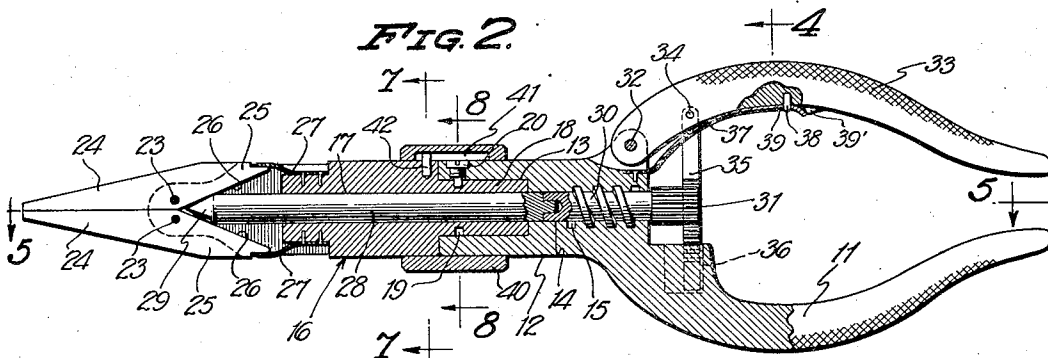
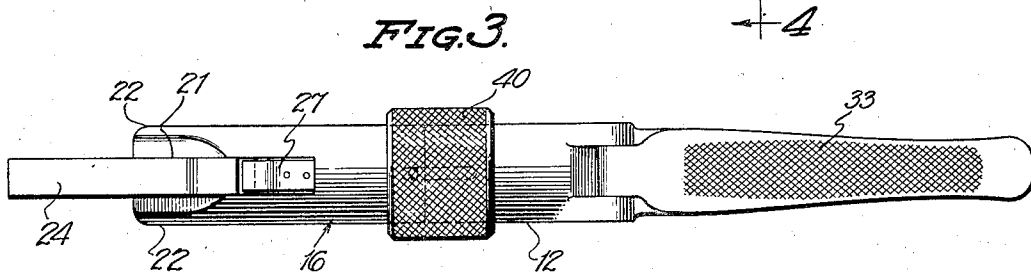
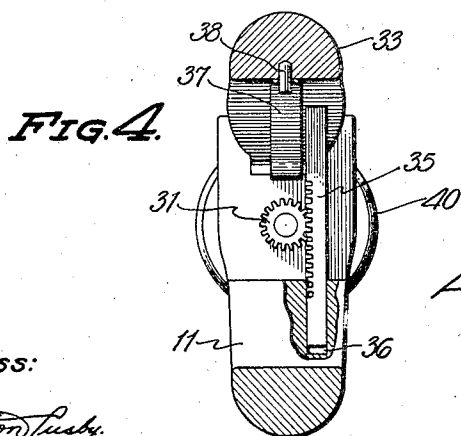
A. J. H. HIRSCH

2,032,415

WIRE TWISTING TOOL

Filed May 25, 1934

3 Sheets-Sheet 1



WITNESS:

B. J. T. J. J.

AARON J. H. HIRSCH.
INVENTOR

BY

Ely & Patterson.
ATTORNEYS

March 3, 1936.

A. J. H. HIRSCH

2,032,415

WIRE TWISTING TOOL

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3 Sheets-Sheet 2

FIG. 5.

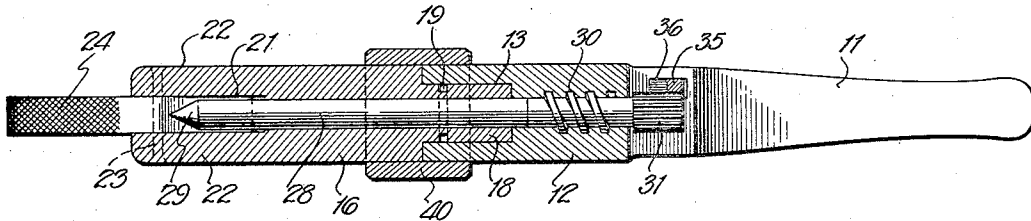


FIG. 6.

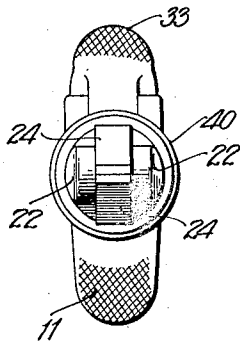


FIG. 7.

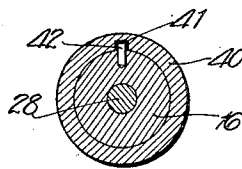


FIG. 8.

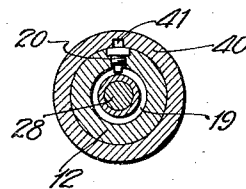


FIG. 9.

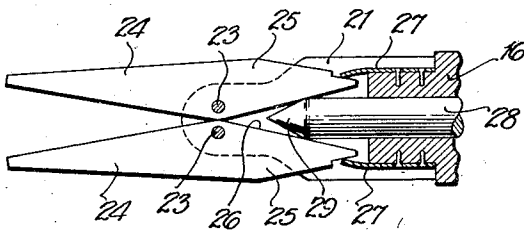


FIG. 10.

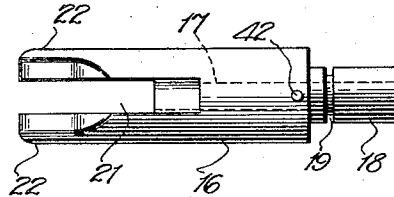
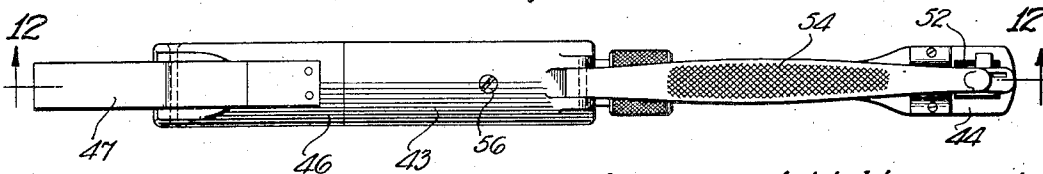


FIG. 11.



WITNESS:

Edw. J. Luby

AARON J. H. HIRSCH.
INVENTOR

BY

Ely & Pattison
ATTORNEYS

March 3, 1936.

A. J. H. HIRSCH

2,032,415

WIRE TWISTING TOOL

Filed May 25, 1934

3 Sheets-Sheet 3

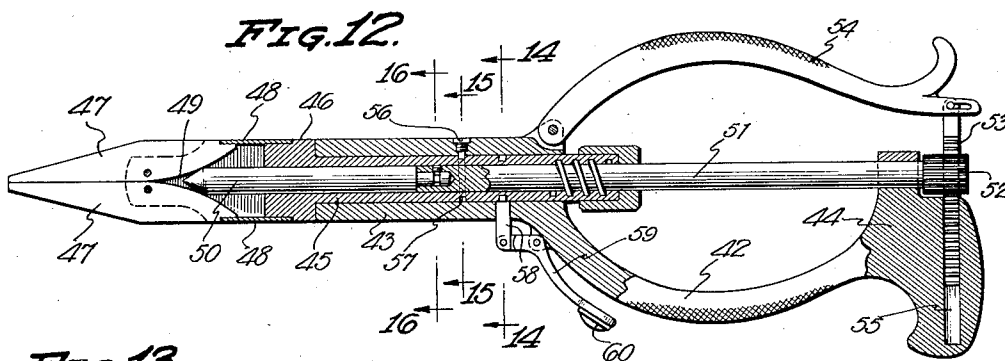


FIG. 13.

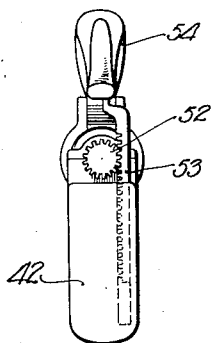


FIG. 14.

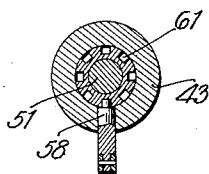


FIG. 15.

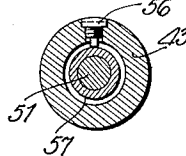
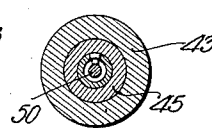


FIG. 16.



WITNESS:

Depton Lusby

AARON J. H. HIRSCH.
INVENTOR

BY

Ely & Patterson
ATTORNEYS

UNITED STATES PATENT OFFICE

2,032,415

WIRE TWISTING TOOL

Aaron J. Hirsch, Plainfield, N. J.

Application May 25, 1934, Serial No. 727,488

5 Claims. (Cl. 81-44)

This invention relates to improvements in pliers and has particular reference to a wire twisting plier.

It is the present practice when twisting the meeting portions of wire to securely clamp the portions between the jaws of an ordinary plier and while so holding the meeting portions, the user imparts a turn to the handle end of the plier whereupon the wire portions become twisted. In the dental profession, it is necessary in the bracing of teeth in the mouth to wire them and to wire appliances therein and secure the wire by twisting the meeting portions. This is a difficult operation in view of the restricted space within the human mouth and the careful manipulation of the plier necessary to prevent accidental injury to the mouth and teeth of a patient. Furthermore, it has been found difficult to maintain a tight grip upon the pliers during the turning movement necessary to turn the same and produce the desired twist of the wire portions. Any accidental release of the grip will release the tension of the wire which is desired for a tight brace for the teeth. It is therefore the main object of the invention to overcome the above objections and which is accomplished by the construction of a tool which is capable of securely clamping the meeting portions of wire, and while securely holding the portions clamped, the clamping end of the tool may be turned relative to the gripping actuating handle thereof to impart a twist to the wire portions.

Another feature of the invention resides in a wire twisting plier for dental, electrical or general use wherein the pivoted jaw ends are normally open but may be closed by the manipulation of actuating handles, while a separate manipulating element is associated with the jaws to enable the twisting of the jaw ends relative to the actuating handles.

A further object of the invention is the provision of a wire twisting plier which is simple and inexpensive of construction, easy of manipulation, and positive of operation.

With these and other objects in view, the invention resides in the novel combination and arrangement of the parts, the essential features of which are hereinafter fully described in the following specification, are particularly pointed out in the appended claims, and illustrated in the accompanying drawings, in which:

Figure 1 is a side elevational view of my wire twisting pliers showing the parts in normal position.

Figure 2 is a vertical longitudinal sectional

view showing the parts in operative or clamping position.

Figure 3 is a top plan view.

Figure 4 is an enlarged detail vertical transverse sectional view on the line 4-4 of Figure 2.

Figure 5 is a horizontal sectional view on the line 5-5 of Figure 2.

Figure 6 is a front elevational view showing the clamping jaws closed.

Figure 7 is a vertical transverse sectional view on the line 7-7 of Figure 2.

Figure 8 is a view similar to Figure 7 but taken on the line 8-8 of Figure 2.

Figure 9 is an enlarged vertical sectional elevational view of the jaw end of the plier.

Figure 10 is a top plan view of the rotatable jaw carrier.

Figure 11 is a top plan view of a modified form.

Figure 12 is a vertical longitudinal sectional view on the line 12-12 of Figure 11.

Figure 13 is a rear end elevational view.

Figure 14 is a vertical transverse sectional view on the line 14-14 of Figure 12.

Figure 15 is a vertical transverse sectional view on the line 15-15 of Figure 12.

Figure 16 is a vertical transverse sectional view on the line 16-16 of Figure 12.

Referring to the drawings by reference characters, the numeral 10 designates my wire gripping and twisting plier in its entirety which includes broadly an elongated body portion A having wire gripping and twisting means B at one end thereof and actuating means C at the opposite end thereof.

More specifically the plier 10 embodies a fixed handle 11 from one end of which extends a cylindrical head 12 which forms part of the body A. The outer end of the head 12 is provided with a socket 13 while extending axially through the cylindrical head is a bore 14, a portion of which is threaded as at 15.

Connected to the cylindrical head 12 for turning movement relative to the head and also forming part of the body A, is a cylindrical carrier member 16 having a bore 17 extending axially therethrough. The inner end of the carrier member 16 is provided with a reduced sleeve or collar 18 which fits into the socket 13. This sleeve 18 is formed with an annular groove 19 into which the reduced inner end of a set screw 20 extends, the said set screw being threaded to the head 12 and countersunk therein. The outer end of the carrier member 16 is bifurcated as at 21 and pivoted between the furcations 22 as at 23 are clamping or gripping jaws 24-24. The

gripping jaws 24 are provided with rearwardly extending tails 25 which are movable into the bifurcations 21, the inner faces of the tails being beveled or inclined as at 26 and the inclined faces of the two jaws extend in an outwardly diverging relation so as to provide a V-shaped crotch between the rear ends of the jaws. Countersunk in the carrier member 16 inwardly of the bifurcation 21 and having one of their ends fixed to the carrier member, are flat springs 27, the free ends of which rest upon the terminal ends of the tails 25 to normally move the tail ends of the jaws inwardly to cause the jaws to open to the position shown in Figure 1 of the drawings.

Extending through the aligned bores 14 and 17 is a turnable and slidable stem 28, one end being tapered as at 29 for contacting engagement with the angular surfaces 26 of the jaws while swivelly connected to the opposite end of the stem is a screw shaft 30 which has threading engagement with the internal threads 15 in the head 12. The outer end of the screw shaft 30 carries a pinion 31.

Pivoted to the head 12 as at 32 is one end of an actuating hand lever 33, the same being disposed opposite the handle 11 and on substantially the same plane as the handle 11. Pivoted to the hand lever 33 as at 34 is one end of a rack bar 35, the free end of the rack bar loosely extending into a well or recess 36 provided in the handle member 11. The rack bar 35 is in constant meshing engagement with the pinion 31 and serves to rotate the pinion and screw shaft 30 whereby the screw shaft slides the stem back and forth toward and away from the tail ends of the jaws 24 for the purpose of imparting an open movement to the jaws 24 against the action of the spring 27, the said spring serving to open the jaws upon disengagement of the stem with the jaws. During movement of the rack bar 35 and due to the arc of the hand lever 33, the rack bar will have a slight lateral movement, but this is compensated for by reason of the free limited movement of the rack bar within the recess 36.

For the purpose of moving the hand lever 33 to a normal jaw releasing position, a spring 37 is provided and which has one end fixedly secured to the head 12 and its free end pressing against the inner side of the hand lever 33, the spring being locked during actuation of the hand lever by reason of a pin 38 which is fixed to the hand lever and enters through a slot 39 in the spring 37.

Thus it will be seen that the lever 33 is locked upon movement of the same toward the handle 11 when it is desired to close the jaws 24 and the jaws locked in clamping position. However, further movement of the lever 33 toward the handle 11 will cause the release of the spring from the pin, as the extreme end of the spring rides onto a cam lug 39' causing the spring to disengage the pin, whereby the tension of the spring moves the lever to normal position.

For the purpose of imparting a turning movement to the carrier member 16 relative to the head 12, I provide a manipulating collar 40 which slides over the meeting ends of the cylindrical head 12 and the carrier member. The collar is provided with an inner longitudinal slot 41 into which the free end of a pin 42 extends, the said pin being fixed to the carrier member 16. It will thus be seen that the pin and slot provide a key connection between the collar 40 and the carrier member 16, and the collar is free to be slid lon-

gitudinally of the body A to various adjusted positions therealong.

In practice, assume that it is desired to twist the looped meeting portions of a wire or pair of wires. With the clamping jaws 24 in a normally open position as shown in Figure 1, the operator grasps the tool by the handle 11, the hand lever 33 being in a position to be actuated by the fingers or palm of the hand which grips the handle 11. The open jaws are inserted about the meeting portions of the wire to be twisted and the operator proceeds to press downwardly upon the hand lever 33 to the position shown in Figure 2. This movement of the hand lever causes the rack bar 35 to turn the pinion 31, which in turn rotates the screw shaft 30 whereby the stem is slid forwardly causing the tapered or conical end 29 thereof to bear against the angular faces 26 on the tail ends of the jaws, and which contact causes the jaws 24 to close upon the wire being gripped. The lever 33 is now locked in the manner hereinbefore described. When the wire is so gripped and held, the operator may by use of the same hand, reach the collar 40 by manipulations of his fingers, move the same longitudinally to a desired adjusted position, and by imparting a turning movement to the collar 40, the carrier 16 and the jaws 24 may be turned relative to the head 12. Any number of turns may be imparted according to the degree of twist desired. It will be appreciated that during the twisting operation, the gripped portions of the wires are held clamped between the jaws so that if the wire or wires be pulled to a certain tension, such tension is not lost during the twisting operation.

After the completion of a twisting operation, the operator may release the locked lever 33 which permits the jaws and actuating mechanism to return to a normal position, as the spring 37 will return the hand lever 33 to the position shown in Figure 1, causing a retractive movement of the screw shaft 30 while the springs 27 will act upon the tail ends of the jaws 24 to swing them to an open or releasing position.

Whereas this type of pliers will be found most practical for use by dentists in wiring up the teeth or appliances to teeth of the human mouth, the same will also be found useful by electricians and others having occasion to twist the meeting portions of a wire or wires without releasing the tension upon the gripped wire or wires.

Referring to the form of my invention shown in Figures 11 to 16 inclusive, the construction is somewhat similar to that shown in the preferred embodiment, but in this instance, the turnable manipulating collar for imparting a turning movement to the jaws is dispensed with, and the jaws are turned by the actuation of the jaw closing actuating means, after the jaws have been moved to clamping position. In this form, the numeral 42 designates a fixed handle having a sleeve like head 43 at one end thereof and an enlarged bearing portion 44 at the opposite end thereof. Passing through the sleeve-like head 43 is the tubular extension portions 45 of a carrier member 46, the said carrier member having its outer end bifurcated and supporting pivoted jaws 47 which are normally moved to an open position by springs 48. The tail ends of the jaws 47 form a crotch 49 for the reception of the pointed end of a stem 50 which is slidably mounted in the carrier member 46, the inner end of the stem being swivelly connected to a screw shaft 51 which has threading engagement with the outer end of the tubular extension 45. The extreme outer end

of the screw shaft 51 is journaled in the bearing 44 and carries a pinion gear 52 which has meshing engagement with a rack bar 53 which has one of its ends operatively connected with an actuating hand lever 54. The other end of the rack bar 53 is slidable in a well or recess 55 provided in the enlarged bearing 44 on the handle 42.

The extension 45 is rotatable with respect to the head 43 but is held against sliding movement by a set screw 56 which enters an annular groove 57 in the tubular extension 45.

For preventing rotation of the tubular extension 45 and the carrier member 46 during actuation of the clamping jaws to a closed position, I provide a pin 58 which is slidable through an opening in the head 43 and which pin is pivotally connected to a rock lever 59, the free end provided with a manipulating portion 60 disposed adjacent the fixed handle member 42. The inner end of the pin 58 is adapted to enter any one of a plurality of sockets or recesses 61 which are radially arranged within the tubular extension 45.

In Figure 12 of the drawings, I have shown the actuating hand lever 54 as being in a position to close the jaws 47 and which action is substantially the same as the operation disclosed in the preceding form. By reason of the engagement of the pin 58 with the tubular extension 45 it will be seen that the carrier 46 will not turn during actuation of the hand lever 54 to close the jaws, but upon a further movement of the lever 54 after the jaws have been moved to clamping position, the manipulating end 60 of the rock lever 59 may be depressed to retract the pin 58 from its recess 61, whereupon rotation of the screw shaft which at this time is at the limit of its inward movement, will impart a turning movement to the tubular extension 45 and which will likewise cause rotation of the carrier member 46 and the jaws 47 to impart the desired twist to the meeting portions of the wire to be twisted. It will thus be seen that upon successive operation of the manipulating lever 54, the wires may be gripped by the jaws 47, and the said jaws turned.

While I have specifically mentioned that the tool is primarily adapted for use in the twisting of wire, the same may also be used for other purposes. For instance, it may be used in the jewelers trade for gripping and turning small articles during the manufacture or repair thereof. Also, small nuts may be gripped and turned to apply and remove them from bolts, and if desired, the gripping jaws may be so arranged as to move toward and away from each other in substantially parallel relation, instead of in converging relation as shown and described.

While I have shown and described several embodiments of my invention, I wish it to be understood that various other constructions may be resorted to to produce the same result, and I do not wish to limit myself to the exact details of construction herein set forth, as such changes as come within the scope of the appended claims may be resorted to if desired.

Having thus described the invention, what I claim as new and desire to secure by Letters Patent of the United States, is:—

1. A tool including in combination, a plurality

of gripping jaws, screw operated means for effecting a gripping operation of said jaws, said means including a pair of relatively movable handles, and means independent of the handles for rotating said jaws relatively thereto.

2. A plier comprising a body having a fixed handle member at one end thereof, a carrier member turnably connected to said body, a hand lever pivoted to said body and disposed opposite said handle member, a pair of clamping jaws pivotally supported upon said carrier member, said clamping jaws provided with tail extensions having angular inwardly facing surfaces arranged in diverging relation, a stem extending through said carrier for longitudinal sliding movement and having its outer end tapered to engage the angular surfaces on the tail extensions, screw actuating means for imparting a back and forward movement to said stem, means operable by said hand lever for operating said screw actuating means, and manipulating means for turning said carrier member relative to said body.

3. A wire twisting plier comprising an elongated body, a pair of pivoted coacting clamping jaws at one end of said body, spring means tending to normally move said jaws to open position, tail extensions on said jaws having angular inwardly facing surfaces arranged in diverging relation, a stem slidably mounted in said body and having one end tapered for bearing engagement with the angular surfaces of said tail extensions, screw actuating means for imparting a back and forward sliding movement to said stem, and hand grip means by which the plier may be held in the hand of a user and operable for actuating said screw actuating means.

4. A wire twisting plier including an elongated body having a fixed handle extending from one end thereof, a hand lever pivoted to said body and movable toward and away from said handle, a pair of coacting clamping jaws pivoted to the other end of said body, tail extensions on said jaws having angular inwardly facing surfaces arranged in diverging relation, spring means acting upon said jaws to normally move them away from each other, a screw shaft threaded within said body, a push rod having one end abutting one end of said screw shaft and its other end tapered for bearing engagement with the angular surfaces on said tail extensions, and a rack and pinion mechanism between said screw shaft and said hand lever whereby actuation of said hand lever will impart reverse rotation to said screw shaft to move the tapered end of said push rod into and out of bearing engagement with said angular surfaces.

5. A wire twisting plier comprising an elongated body having a fixed handle extending from one end thereof, a hand lever pivoted to said body and movable toward and away from said handle, a pair of coacting clamping jaws pivoted to the other end of said body, spring means tending to normally hold said jaws in open position, screw actuated means for closing said jaws against the action of said spring means, and means operable by said hand lever for operating said screw actuated means.

AARON J. H. HIRSCH.