May 27, 1941. M. A. BUETTELL 2,243,086

PLIERS

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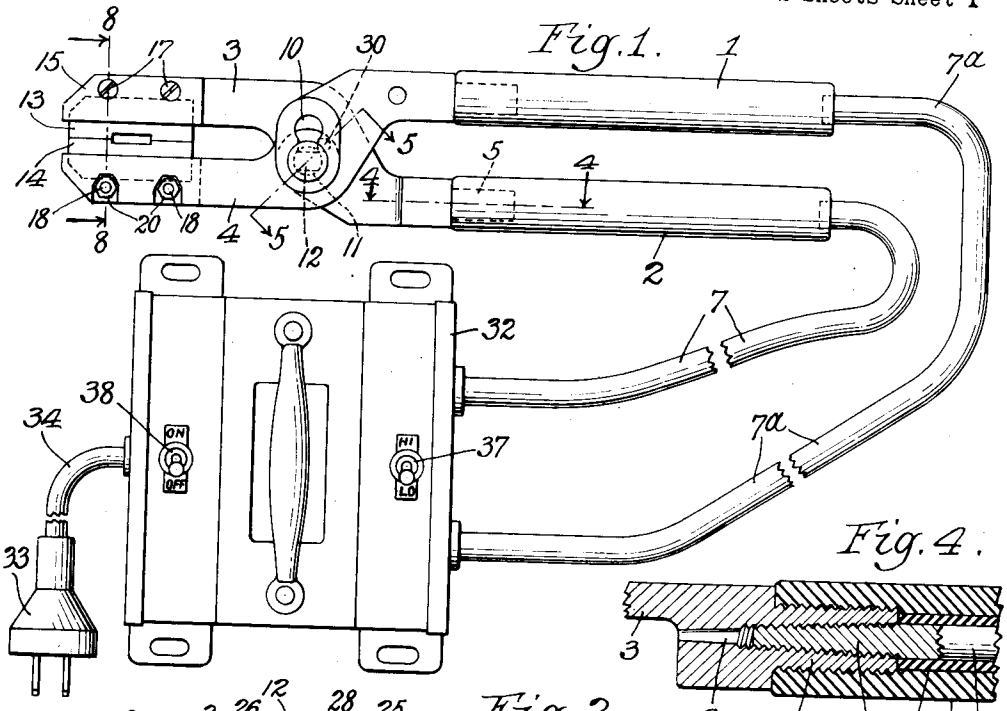

Fig. 1.

Fig. 4.

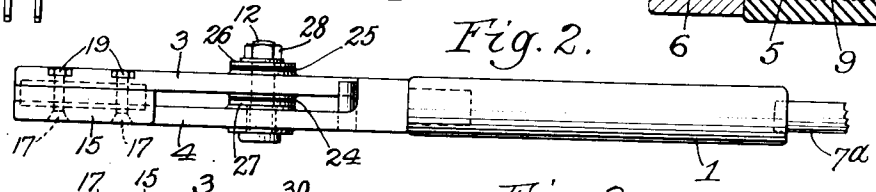

Fig. 2.

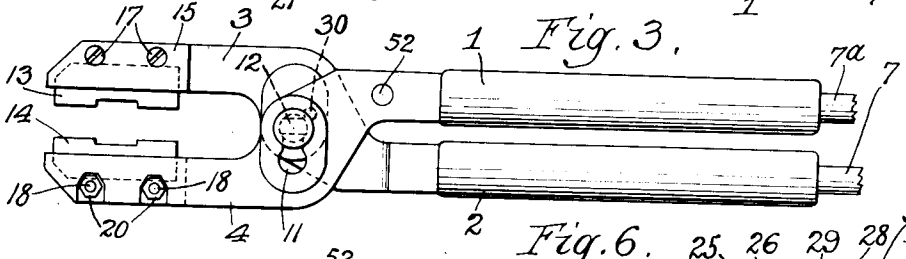

Fig. 3.

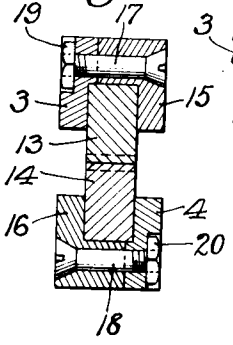

Fig. 8.

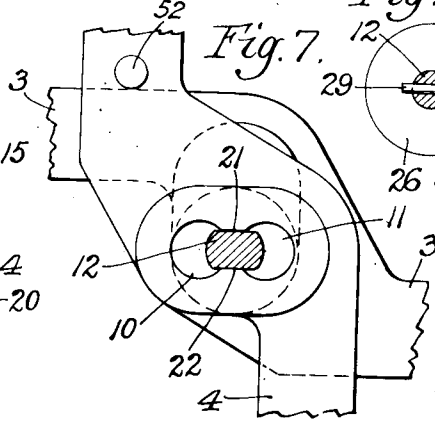

Fig. 7.

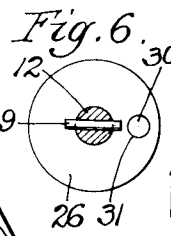

Fig. 6.

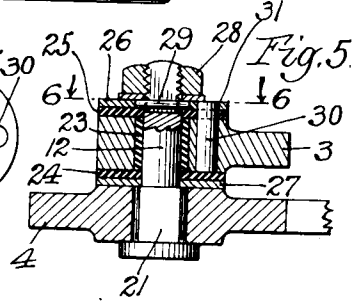

Fig. 5.

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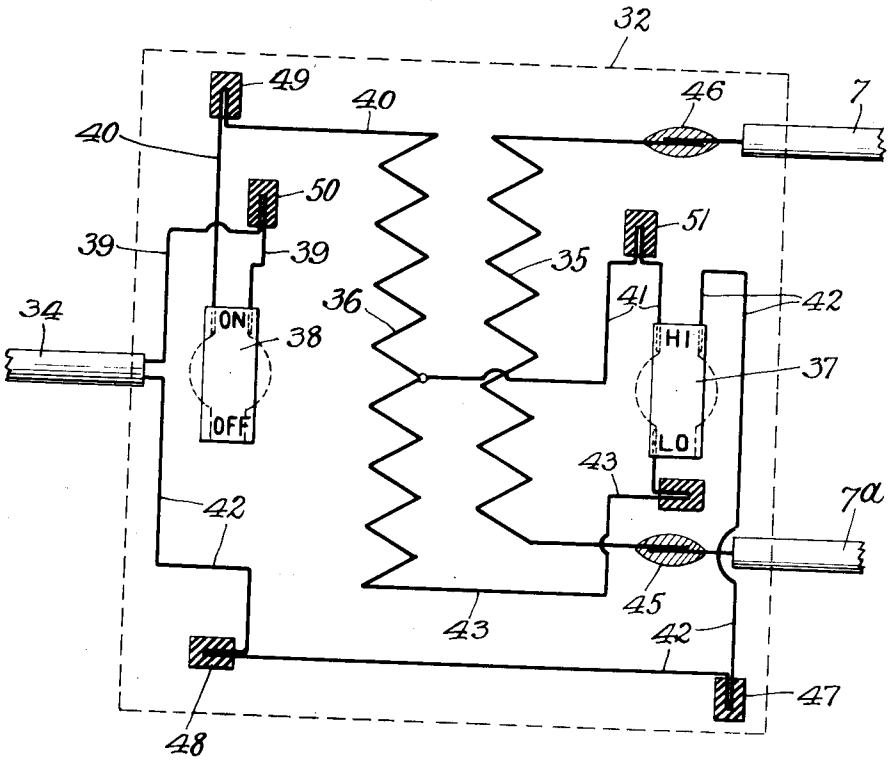
Fig. 9.



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Patented May 27, 1941

2,243,086

UNITED STATES PATENT OFFICE

2,243,086

PLIERS

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Application November 9, 1937, Serial No. 173,584

2 Claims. (Cl. 219—26)

This invention relates to pliers and has for its object to provide a new and improved device of this description.

The invention has as a further object to provide pliers particularly adapted for use in heating metal pieces for the purpose of uniting them with solder or uniting them by fusion. The invention has as a further object to provide a device of this description which is cheap in construction, easy to handle and effective in operation.

The invention has other objects which are more particularly pointed out in the accompanying description.

Referring now to the drawings, Fig. 1 is a view of one form of device embodying the invention;

Fig. 2 is an edge view of the construction shown in Fig. 1, with parts omitted;

Fig. 3 is a view similar to Fig. 1, with parts omitted, showing the jaws in position to engage larger pieces;

Fig. 4 is an enlarged sectional view taken on line 4—4 of Fig. 1;

Fig. 5 is an enlarged sectional view taken on line 5—5 of Fig. 1;

Fig. 6 is a sectional view taken on line 6—6 of Fig. 5 with parts omitted;

Fig. 7 is a view showing the method of changing the jaws of the pliers for large or small articles;

Fig. 8 is an enlarged sectional view taken on line 8—8 of Fig. 1; and

Fig. 9 is a diagrammatic view of the transformer.

Like numerals refer to like parts throughout the several figures.

Referring now to the drawings, in the construction illustrated there is shown a pair of pliers consisting of the handles 1 and 2 which are of insulating material. Connected with these handles are the jaws 3 and 4 of the pliers. These jaws connect with the handles in any desired manner and there are also connected with these jaws the electrical conductors 7 and 7a which conduct the current to the jaws. It is important in making the connection of the conductors to the jaws that such connections be mechanically strong and of low contact drop electrically and one that will stand high heat without becoming loose. Such a construction is preferably used herein and is shown in Fig. 4, where the jaw 3 has a member 5 which projects into the hollow handle 2. The projection 5 is provided with a threaded opening 6 which is preferably tapered from the outer end toward the body portion thereof. The conductor 7 which extends into the hollow handle 2 is preferably made up of a series of strands and is provided with an insulating cover 8. The insulating cover is removed from the end 9 and this end is then threaded into the opening 6 by rotating the cable until it has worked itself way in, as shown, for example, in Fig. 4. This gives a strong joint with a very small resistance or drop electrically and it will stand high heat without becoming loose, as would be impossible if a solder joint were used.

The two jaws 3 and 4 are connected together in any desired manner. As herein shown, these jaws have an opening provided with the enlarged ends 10 and 11. A pin 12 passes through this opening and acts as the pivot for the jaws. One of the jaws is insulated from the pivot and from the other jaw. The ends of the jaws are provided with the carbon pieces 13 and 14 which project inwardly from the jaws and between which the article to be acted upon is received. These carbon pieces are held in position in any desired manner. As herein shown, the jaws are provided on opposite sides with the separate pieces 15 and 16 and are provided with recesses for the carbon pieces 13 and 14. There are fastening devices 17 and 18 for fastening the pieces 15 and 16 to the jaws. These fastening devices are preferably provided with threaded ends and nuts 19 and 20 so that when the nuts are tightened up, the carbon pieces are clamped between the pieces 15 and 16 and the body portions of the jaws 3 and 4. This construction makes it unnecessary to have holes through the carbon pieces.

The pivotal connection between the two jaws may, of course, be of any suitable construction. There is here illustrated a construction whereby the same jaws may be used for large or small pieces, and at the same time have the opposed carbon engaging members with their faces substantially parallel. Fig. 1 shows the arrangement for small pieces and Fig. 3 shows the arrangement for larger pieces. This result is secured by means of the elongated openings in the jaws which have enlarged end 10 and 11, and the pin 12. The pin 12 has opposed flat sides 21 and 22. When it is desired to use the pliers with small pieces, this pin is in the lower enlargement 11, as shown in Fig. 1, and when it is desired to use the pliers with larger pieces, this pin is in the upper enlargement 10, as shown in Fig. 3. This pin must also be insulated from

one of the jaws and the jaws insulated from each other. This pin construction is an important point in the construction of the pliers and must accomplish certain functions. It must connect the jaws, but be electrically insulated to prevent transfer of current between the jaws. It must be fastened rigidly to one of the jaws with sufficient mechanical strength to take the pressure of the clamping the jaws together onto the piece to be heated. It must be locked in a definite position so that the flattened portion is held fixed and must be arranged to allow slipping of the jaws from open to closed position and permit holding in each of these positions. Furthermore, the material which electrically insulates the pin and the jaws must also stand a very high heat, since the heat from the ends of the jaws travels back through this pin.

The construction of this pin **12** and associated parts is shown in Fig. 5. In this construction an insulating bushing **23**, preferably of mica, is pressed into the straight hole in one jaw. Insulating washers **24** and **25** are placed on each side of the jaw containing the insulating bushing. Steel washers **26** and **27** are placed on the outside of the insulating washers **24** and **25**. The end of the pin is screwthreaded and there is a nut **28** on this screwthreaded end which is tightened up to clamp and hold the parts in position. The steel washer **26** under the nut **28** is provided with a key-way into which is received a steel locking pin **29** which is carried in a slot in the threaded end of the pin. This therefore locks the washer and the pin together. There is an insulating pin **30** which passes through a hole **31** in the steel washer and which also passes through the insulating washer **25** and through the jaw **3**, as clearly shown in Figs. 5 and 6. This locks the washer **25** and the pin **12** to the jaw **3** and prevents the pin **12** from turning. The jaw **4** is pivoted on the pin, that is, it rotates or rocks on the pin, so that the two jaws may be opened and closed. When it is desired to move the pin to either of the enlargements **10** or **11**, the jaws are moved to the position shown in Fig. 7, whereupon by relative movement of the jaws, the pin **12** can be moved into either enlargement.

The device is connected in circuit in any desired manner. As herein shown, I provide a transformer **32** with which the conductors **7** and **7***a* are connected. This transformer is connected in circuit in any desired manner, as by means of a plug **33** and a flexible cord **34** which may be of any of the usual types, so that the device can be easily and quickly plugged into circuit. The conductors **7** and **7***a* are connected to the transformer in any desired manner. As herein shown, see Fig. 9, the conductor **7** is connected to one terminal of the transformer coil **35** and the conductor **7***a* to the other terminal of the transformer coil. The transformer coil **36** is connected in the circuit by the cord **34**. I prefer to provide means for having a high or low temperature for the device that is heated between the jaws. This is secured in any desired manner. One method is shown in the drawings wherein the transformer is provided with the switches **37** and **38**. The switch **38** connects the conductor **39** of the cord **34** with the conductor **40** connecting with the transformer coil **36**. The switch **37**, when in the high position, connects the conductor **41** with the coil **36** at a point intermediate its ends, as shown in Fig. 9. It also connects the conductor **41** with the conductor **42**, which is the other conductor in the cord **34**. When the switch **37** is in the low position, it connects the conductor **43**, which is attached to the end of the transformer coil **36**, to the conductor **42** which is one of the conductors of the cord **34**. It will therefore be seen that when the switch **37** is in its high position, only a part of the transformer **36** is in circuit and when it is in its low position, the entire transformer coil is in circuit. The conductors **7** and **7***a* are preferably connected to the transformer coil **35** by soldered connections **45** and **46**. The other connections **47**, **48**, **49**, **50** and **51** are preferably made by Jasper connections, such as shown in the Jasper Patent No. 1,700,985, issued February 5, 1929.

In the use of the device, the parts, such as pieces of pipe, electrical conductors, rods, wires or other metal parts, to be connected together are placed in between the jaws of the pliers and in engagement with the carbon pieces **13** and **14** and the current is then passed through the jaws and through the pieces and they are heated to the desired heat, and the solder can then be easily and quickly applied to solder them together, or the heat may be such as to fuse the pieces together. It will be seen that by means of this device, I can easily and quickly heat parts which are to be soldered together and apply solder thereto, or I can heat them so as to fuse them together.

Means is provided for aligning the narrow slot portion between the holes **10** and **11** with the flat sides **21** and **22** of the pin **12**. As herein shown, this result is secured by means of a projection **52** on the handle portion of one of the jaws, as, for example, jaw **4**. When the jaws are open, this projection engages the upper side of the handle portion of jaw **3**. This aligns the narrow slot between the holes **10** and **11** with the flat sides **21** and **22** of the pin **12** when the parts are in the position shown in Fig. 7.

I have described in detail a particular construction, but it is of course evident that the parts may be varied in many particulars without departing from the spirit of the invention as embodied in the claims hereto appended, and I therefore do not limit myself to the particular construction shown.

I claim:

1. A pair of pliers comprising two jaws, means for connecting them in an electric circuit, a pivot pivotally connecting said jaws together, electrically insulated from one jaw, said jaws having opposed end pieces provided with opposed elongated recesses having flat walls, said recesses extending only part way through said end pieces, there being a solid portion of each jaw beyond each recess, said recesses being open at one side, flat elongated carbon pieces in said recesses, engaging the flat walls of said recesses and having projecting portions projecting from said jaws toward each other, clamping conducting pieces for closing the open sides of said recesses and engaging the sides of said carbon pieces, and means for fastening said clamping conducting pieces in position to clamp the carbon pieces tightly in place, whereby a maximum area of contact between said jaws and carbon pieces is secured and oxidation thereof minimized.

2. A pair of pliers comprising two jaws, means for connecting them in an electric circuit, a pivot pivotally connecting said jaws together, electrically insulated from one jaw, said jaws having opposed end pieces provided with opposed elon-

gated recesses having flat walls, said recesses extending only part way through said end pieces, there being a solid portion of each jaw beyond each recess, said recesses being open at one side, flat elongated carbon pieces in said recesses, engaging the flat walls of said recesses and having projecting portions projecting from said jaws toward each other, clamping conducting pieces for closing the open sides of said recesses and engaging the sides of said carbon pieces, and fastening devices passing through said clamping conducting pieces and the material of said end pieces beyond said recesses, which clamp the clamping conducting pieces tightly against the carbon pieces to hold them in position, whereby a maximum contact is secured between the end pieces and the carbon pieces to receive the pressure on the carbon pieces when the jaws are closed on the article with which the pliers are used.

MARC A. BUETTELL.