July 19, 1938. B. WEHMER 2,123,870

EYEBROW PLUCKER

Filed Sept. 24, 1934 2 Sheets-Sheet 1

Fig. 1.

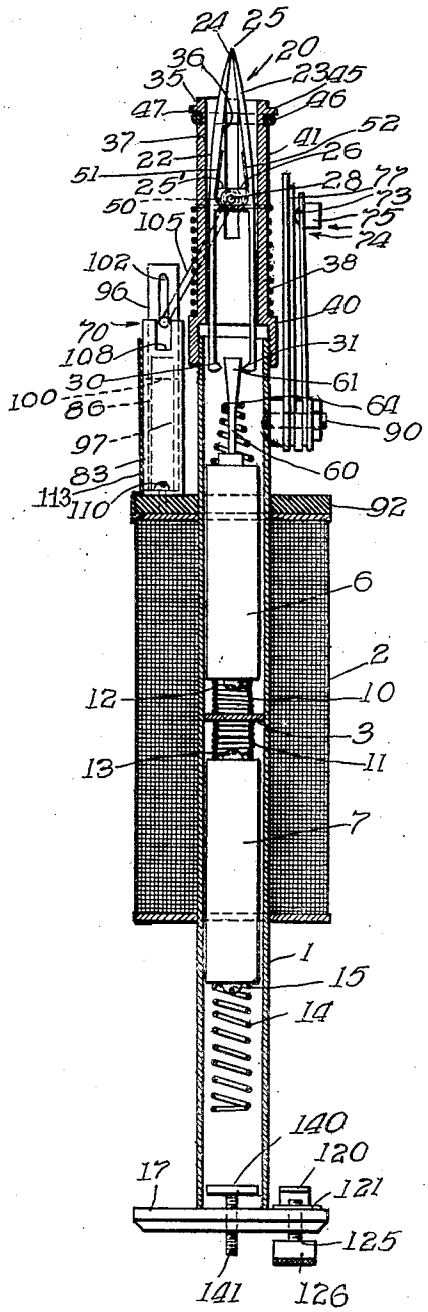
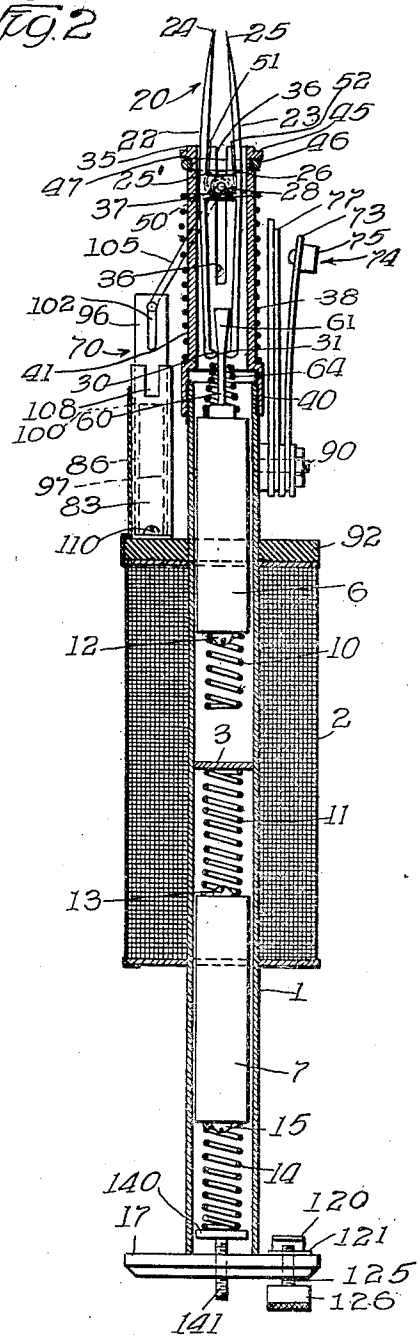


Fig. 2



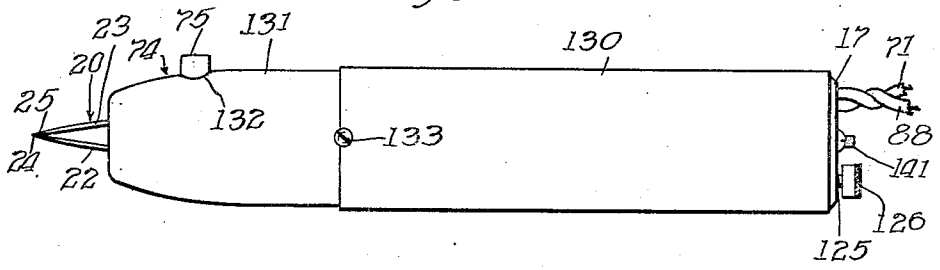
Inventor:
Bruno Wehmer.
By Brown, Jackson, Boettcher & Dienner
Attys

July 19, 1938. B. WEHMER 2,123,870

EYEBROW PLUCKER

Filed Sept. 24, 1934 2 Sheets-Sheet 2

Fig. 3.



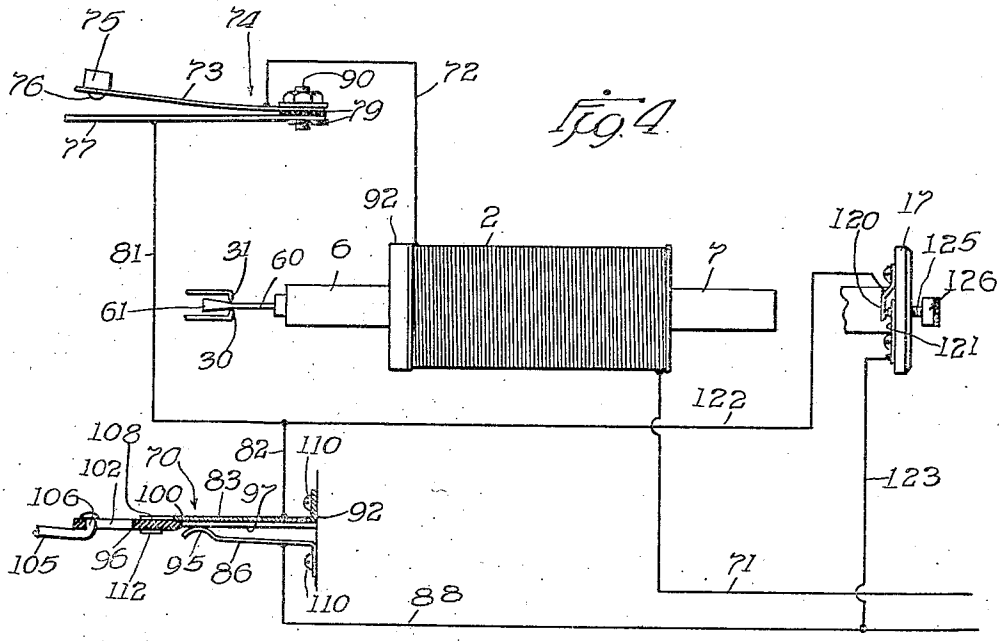
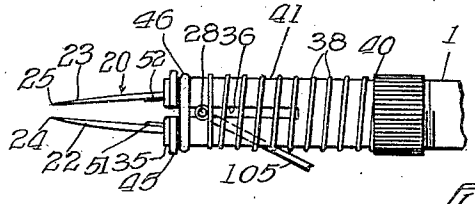


Fig. 4.

Fig. 5.



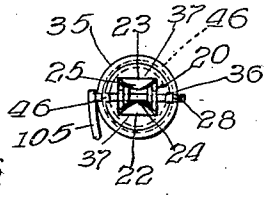


Fig. 6.

Inventor:
Bruno Wehmer

By Brown, Jackson, Boettcher & Dunn
Attys

Patented July 19, 1938

2,123,870

UNITED STATES PATENT OFFICE

2,123,870

EYEBROW PLUCKER

Bruno Wehmer, Chicago, Ill.

Application September 24, 1934, Serial No. 745,171

12 Claims. (Cl. 128—355)

The present invention relates to devices for plucking the hair of the eyebrow for the purpose of bringing the eyebrow to the proper or desired shape.

The principal object of the present invention is the provision of a simple and inexpensive device of this class which is easy to operate, light in weight and convenient to use. Specifically, it is an object of the present invention to provide an electrically operated device which includes a reciprocable tweezer-like operating unit actuated by electro-magnetic means and capable of being controlled so as to optionally secure a continuous operation of the tweezers or to secure a single operation thereof, as desired.

A further object of the present invention is the provision of a device of this nature which includes compensating or counterbalancing means to neutralize the effects of the vibrations of the operating unit.

Another object of the present invention is the provision of a slotted support in which a pair of hingedly connected tweezers are slidably mounted and adapted to be opened and closed, as well as reciprocated back and forth, by a plunger operated wedge member which first closes the tweezers and then shifts the same inwardly to withdraw the hair grasped by the tweezers.

These and other objects and advantages of the present invention will be apparent to those skilled in the art after a consideration of the following detailed description, taken in conjunction with the accompanying drawings:

In the drawings:

Figures 1 and 2 are longitudinal sections, showing the operating parts in two positions, Figure 1 showing the tweezer unit in its inner or retracted position and Figure 2 showing the tweezer unit in its extended or outer position;

Figure 3 is an elevational view showing the housing surrounding the mechanism illustrated in Figures 1 and 2;

Figure 4 is a view showing the electrical connections and also certain details of the interrupter switch which provides for continuous operation;

Figure 5 is an external view showing the manner in which the tweezer unit is slidably supported in the front end of the tubular supporting member; and

Figure 6 is an end view looking toward the operating end of the tweezer unit.

Referring now more particularly to Figures 1 and 2, the reference numeral 1 indicates a tubular supporting member on the central portion of which the winding of an electric solenoid 2 is mounted, the middle section of the supporting member 1 including a partition 3 disposed in the center of the solenoid 2 for a purpose which will hereinafter appear. Plungers 6 and 7 are disposed on opposite sides of the central partition 3, the plunger 6 being referred to as the operating plunger and the plunger 7 being referred to as a counterbalancing or compensating plunger. The plungers 6 and 7 are formed of magnetic material so that when an electric current is sent through the coil 2 both of the plungers 6 and 7 are drawn inwardly toward the central partition 3, and for the purpose of cushioning the plungers 6 and 7 as they approach their inner limit of movement, springs 10 and 11 are connected, respectively, with the inner ends of the plungers 6 and 7 by screws 12 and 13 or the equivalent. A cushioning spring 14 is secured by a screw 15 to the outer end of the counterbalancing plunger 7, and this spring cooperates with a cap 17 in cushioning the outward movement of the plunger.

The operating unit which is actuated by the electric solenoid 2, energized by either direct or alternating current, is indicated in its entirety by the reference numeral 20 and comprises a reciprocally mounted tweezer assembly including blades 22 and 23 having pointed ends 24 and 25 formed when closed to grasp one or more hairs of the eyebrow for the purpose of plucking the same. The tweezer blades each include lugs 25' and 26 which are turned inwardly to receive a pivot pin 28 by which the tweezer blades 22 and 23 are pivotally connected together. The inner ends 30 and 31 of the tweezer blades 22 and 23 are formed to be engaged by suitable operating mechanism associated with the plunger 6 and which will be described later.

The end of the tubular supporting member 1 in which the tweezer unit is slidably mounted is indicated by the reference numeral 35, and this end of the member 1 is provided with slots 36 on both sides thereof to receive the hinge pin 28 of the tweezer unit 20. The end 35 is formed with a square bore 37, as best shown in Figure 6, which receives the tweezer unit 20 and cooperates with the hinge pin 28 in preventing the tweezer unit 20 from turning. The hinge pin 28 is extended laterally outwardly with respect to the slots 36 a sufficient distance to be engaged by a spring 38 which is biased between the hinge pin 28 of the tweezer 20 and a shouldered section 40 formed on the forward section 41 of the supporting member 1. The spring 38 biases the operating unit 20 for outward movement in the bore 37, and for limiting the outward movement of the tweezer 20 the

outer end 35 of the tubular section 41 is provided with a flange 45 against which a stop in the form of a spring ring 46 is placed, preferably in a groove 47. Preferably, the slotted section 36 of the supporting member 1 has its shouldered portion 40 provided with internal threads so that the section 41 can be threaded onto the outer end of the supporting tubular member 1, and after being threaded thereon it may be soldered to hold the end 41 in its proper position. The tweezer blades 22 and 23 are biased to open position by means of a rat trap spring 50 having its coiled sections embracing the hinge pin 28 and ends 51 and 52 disposed forwardly and reacting against the forward sections of the tweezer blades 22 and 23.

The operating connection between the tweezer or operating unit 20 and the operating plunger 6, energized by the coil 2, will now be described. A stud 60 having a wedge section 61 disposed between the inner ends 30 and 31 of the tweezer blades 22 and 23 is securely fastened to the forward or outer end of the working plunger 6 in any desired manner. The length of the stud 60 is such that when the plunger 6 is in its outer position, that shown in Figure 2, the wedge portion 61 is disposed outwardly of the inwardly turned ends 30 and 31 so that the tweezer blades 22 and 23 are held open by the spring 50. As soon, however, as a current is sent through the solenoid 2, the plunger 6 is drawn inwardly, and this movement of the plunger 6 first causes the wedge section 61 of the stud 60 to spread the inner ends 30 and 31 of the tweezer blades apart against the tension of the spring 50. The spring 38 is stronger than the spring 50 so that the spring 38 opposes any appreciable amount of inward movement of the tweezer unit 20 as a whole until the movement of the wedge section 61 closes the tweezer to bring the ends 24 and 25 either into contact with each other or into contact with an eyebrow hair interposed therebetween. Once the tweezer blades are closed, however, the wedge 61 can no longer move with respect to the inner ends 30 and 31 of the tweezers, so that the further inward movement of the plunger 6 draws with it the entire tweezer assembly 20, sliding the unit 20 in the square bore 37 and hinge pin 28 in the slots 36 and against the tension of the spring 38 until the tweezer unit 20 reaches its inner limit of movement. This retractive movement of the tweezer unit 20 withdraws the hair grasped by the tweezer points 24 and 25 from the eyebrow.

At the same time that the energization of the solenoid 2 causes the plunger 6 to be drawn inwardly, the compensating or counterbalancing plunger 7 is also drawn inwardly, and the purpose of the latter and the cushioning springs 11 and 14, is to eliminate the effect of the rapid vibration or oscillations of the plunger 6. Since these plungers move in opposite directions, practically all jarring and shaking of the appliance are avoided. One of the factors limiting the inward movement of both of these plungers is the compression of the cushioning springs 10 and 11 carried by the plungers 6 and 7, respectively. As soon as the energization of the solenoid 2 is interrupted the springs 10 and 11 force the plungers 6 and 7 outwardly, the cushioning spring 14 limiting and cushioning the outward movement of the plunger 7 and the outward movement of the working plunger 6 shifting the wedge section 61 from between the ends 30 and 31 of the tweezers so that the spring 50 thereof can open the tweezers, and at the same time the spring 38 forces the entire tweezer unit 20 outwardly to the position shown in Figure 2. In order to insure that the tweezer unit 20 will be shifted to its extended position, the outer end of the operating plunger 6 carries a spring 64 which surrounds the wedge pin 60 and is adapted to engage the inner ends of the tweezers 22 and 23. The spring 64 also serves to cushion the outward movement of the operating plunger 6 when the solenoid 2 is deenergized.

According to the principles of the present invention, the tweezer unit 20 may be arranged for continuous reciprocation, following the cycle of first closing the tweezers and then retracting the same as outlined above, or the device may be arranged for single stage operation in which each successive reciprocation of the operating unit 20 is capable of being separately controlled and initiated.

For continuous operation, I prefer to use an interrupter in the form of a switch 70 which automatically opens and closes the circuit to the solenoid 2 in correlation with the reciprocations or oscillations of the operating tweezer unit 20. Figure 4 illustrates the wiring and certain structural features of the interrupter switch 70. Referring now to Figure 4, the solenoid 2 is adapted to be energized by any suitable source of current, and to this end I provide a lead or conductor 71 which is connected with one end of the coil 2, the other end of the coil being connected by a lead 72 with the blade 73 of a manually controlled switch 74. The blade 73 includes an insulating contact button 75 and an electric contact point 76 which is adapted to engage a stationary blade 77 forming a portion of the switch 74. The blades 73 and 77 are electrically insulated from one another, as at 79, and the blade 77 is connected by a conductor 81 to a short lead 82 which is, in turn, connected to a stationary contact blade 83 which forms a part of the interrupter switch 70. A flexible blade 86 is arranged to electrically connect a conductor 88 with the stationary blade 83, the conductor 88 leading to the other side of the source of electric current. As best shown in Figures 1 and 2, the main switch 74 is carried upon a pin 90 which is supported on the forward end of the supporting tubular member 1, and the interrupter or make and break switch 70 is mounted upon a head 92 carried at the forward end of the solenoid 2 by the supporting member 1. The head 92 is preferably formed of insulating material so that no current can flow from the conductor 82 to the conductor 88 unless the switch blades 83 and 86 are in engagement.

The outer end of the switch blade 86 is curved, as indicated at 95, and the blade 86 is preferably formed of spring material so that a separating strip 96 formed of insulating material can be forced in between the switch blades 83 and 86 to interrupt the flow of current through the solenoid 2. The interrupter strip 96 is suitably supported in the stationary blade 83, as by having the sides 97 thereof turned over to form a groove in which the interrupter strip is slidable. Preferably, the switch blade 86 is wider than the stationary blade 83, so that contact between these two parts is had at the edges 97. The entering end 100 of the interrupter member 96 is preferably tapered to facilitate the separation of the contact 86 from the contact 83.

The outer end of the interrupter strip 96 is provided with a slot 102 therein, and a link 105 is connected with one end of the hinge pin 28

and has its other end 106 disposed within the slot 102. Preferably, the end 106 is riveted over after it has been inserted in the slot 102 for the purpose of keeping the link 105 in place, and the stationary contact 83 is provided with a notch 108 to accommodate this end of the link 105. Preferably, the contact blades 83 and 86 are secured by screws 110 or the equivalent to the insulating head 92. The interrupter strip 96 is held in the slot or groove formed by the edges 97 of the blade 83 by means of a tab 112 which is turned over, as best shown in Figure 4, so as to embrace the interrupter strip 96. A sheet of insulation 113 protects the interrupter switch 70.

From the above description it will be clear, especially from Figure 4, that in order to energize the solenoid 2 the switch 74 must be closed and also the interrupter switch 70 must also be closed. However, from Figure 2 it will be clear that the inactive position of the tweezer unit 20, under the influence of the spring 38, is at the outer end of the supporting member 1, and this, acting through the link 105, causes the interrupter strip 96 to be normally held outwardly of the curved end 95 of the switch blade 86, this being the position shown in Figure 4. Normally, therefore, the interrupter switch 70 is closed so that all that it is necessary to do to start the operation of the device is to close the switch 74. As soon as this switch is closed, current travels through the conductor 88, the switch blades 86 and 83, the conductors 82 and 81, the switch 74, the conductor 72, solenoid coil 2, and the conductor 71. The energization of the coil 2 causes the plunger 6 to first close the tweezer blades 22 and 23 and then retract the tweezer unit 20 inwardly, thus pulling out all hairs grasped between the points 24 and 25 of the tweezers, and the inward movement of the hinge pin 28 moves the link 105 to the bottom of a slot 102, and then the further movement of the pin 28 and link 105 forces the interrupter strip 96 in between the blades 83 and 86. As soon as the blades 83 and 86 are separated, the current flowing through the solenoid 2 is interrupted even though the switch 74 is held closed. The interruption of the current releases the pull on the operating plunger 6 so that the spring 38 forces the tweezer unit 20 outwardly about the same time that the cushioning spring 10 forces the plunger 6 outwardly to release the wedge section 61 from between the ends 30 and 31 of the tweezer. The outward movement of the tweezer unit 20, however, carrying with it the hinge pin 28 and the link 105, withdraws the interrupter strip 96 from between the blades 83 and 86 after the end 106 of the link 105 engages the outer end of the slot 102. This causes the resilient switch blade 86 to engage the switch blade 83, with the result that the solenoid 2 is again energized and the operating plunger 6 withdrawn inwardly, first closing the tweezer blades 22 and 23 and then withdrawing the unit 20 inwardly again. This continues in rapid succession so long as the switch 74 is held closed.

If a single stage operation is desired, that is, if it is desired that tweezer unit 20 make only a single oscillation when the button 75 is pressed, the interrupter switch 70 may be short circuited by any suitable means. For example, the rear cap 17 is preferably provided with a pair of contacts 120 and 121 (Figure 4) connected by suitable leads 122 and 123 with the conductors 82 and 88, respectively. A contact screw 125 is threaded through the contact blade 121 and is adapted when screwed inwardly to engage the contact blade 120 for the purpose of short circuiting the interrupter switch 70. As soon as this short circuit is established, the inward movement of the tweezers 20 will not interrupt the flow of current through the solenoid, so that as soon as the button 75 of the switch 74 is pressed to close the circuit at 76—77, the solenoid 2 is energized and the tweezers drawn inwardly, but the inward movement of the interrupter strip 96 in separating the blades 83 and 86 does not interrupt the flow of current through the solenoid 2. Thus, the tweezer unit 20 is withdrawn inwardly and held in that position against the tension of the spring 38 so long as the switch 74 is kept closed. As soon as the switch 74 is opened, then the plunger 6 is released and the tweezer unit 20 springs to its extended position as shown in Figure 2. Preferably, the screw 125 is provided with an insulating knob 126.

Since the plunger 7 is a counterbalancing or compensating plunger, it may be necessary to provide for some adjustment of the frequency of oscillations of the plunger 7, and to this end I provide an adjusting screw 140 having a kerf 141 in the end of the screw which projects outwardly of the cap 17. Screwing the member 140 in or out serves to adjust the natural frequency of oscillation of the compensating plunger 7.

All of the operating parts described above are arranged to be enclosed within a housing of relatively small dimensions, thus facilitating the use of the device as a hand implement. Figure 3 best shows a housing which consists of a cylindrical section 130 which is of substantially the same diameter as the solenoid coil 2 and the rear cap 17. The forward portion of the housing is formed by a flattened tapered housing section 131 which includes an opening 132 therein to accommodate the button 75 of the switch 74, and small screws 133 serve to hold these two housing sections 130 and 131 together. It is important to note that both the main switch 74 and the interrupter switch 70 are within the confines of a cylinder of approximately the same diameter as the solenoid coil 2, so that the mechanism does not occupy or require a housing of any greater diameter than the coil 2 itself. This provides an appliance which is easily and conveniently handled by hand.

While I have shown and described above the preferred structure in which the principles of the present invention have been embodied, it is to be understood by those skilled in the art that my invention is not to be limited to the specific details shown and described, but that, in fact, widely different means may be employed in the practice of the broader aspects of my invention.

What I claim, therefore, and desire to secure by Letters Patent is:

1. A device for plucking the hair of the eyebrow comprising a tubular supporting member having means at one end providing a square bore, said means being slotted along said square portion, a pair of tweezers slidably but nonrotatably supported in said square bore, a hinge pin pivotally connecting said tweezers and slidably mounted in said slots, and means for reciprocating said tweezers.

2. A device for plucking the hair of the eyebrow comprising a tubular supporting member having means at one end providing a square bore, said means being slotted along said square portion, a pair of tweezers slidably but nonrotatably supported in said square bore, a hinge pin pivotally

connecting said tweezers and slidably mounted in said slots, means for reciprocating said tweezers, spring means carried exteriorly of said slotted portion of the tubular supporting member and reacting against said hinge pin for shifting the tweezers in one direction, and means for closing the tweezers and shifting them in the other direction.

3. A device for plucking the hair of the eyebrow comprising reciprocally mounted tweezers, an electric solenoid having a movable plunger, means providing for the opening and closing of the tweezers and reciprocation thereof by said plunger, means actuated by the reciprocation of the tweezers for making and breaking the circuit through said solenoid so as to secure continuous operation, and means for short-circuiting said make and break apparatus to secure non-continuous operation.

4. In a hair plucking device, a tubular supporting member having a slotted section at one end, hingedly connected tweezers slidably supported within said member at said one end and including a hinge pin extending outwardly through said slots, solenoid means mounted at the other end on said tubular supporting member, a plunger reciprocably mounted within said tubular supporting member and operatively connected with said tweezers to actuate the same, and make and break mechanism disposed alongside said tubular supporting member and operatively connected with said hinge pin to provide for a continuous reciprocation of said tweezers.

5. A hair plucking device comprising a tubular supporting member one end of which is slotted, a pair of tweezers slidably mounted within said tubular member adjacent one end and including a part extending outwardly through said slot, electric solenoid means mounted on the other end of said tubular supporting member, a generally cylindrical casing closely fitting said solenoid and extending around said one end of the tubular supporting member, make and break mechanism extending generally longitudinally of said supporting member exteriorly of the same adjacent said one end and operatively connected with said extending part of the tweezers, and switch means mounted on said tubular supporting member generally opposite said make and break mechanism, the latter and said switch means both being disposed within said casing.

6. A hair plucking device comprising a tubular support having a slot in one end, a tweezer unit slidably supported in said slot and having a member extending therefrom, a solenoid supported by said tubular casing and including a plunger movable within said casing and operatively connected with said unit, spring means surrounding said casing and reacting against said member to bias said tweezer unit for movement relative to the casing in one direction, the energization of said solenoid moving said plunger and unit in the opposite direction, and an interrupter switch controlled by said extended member of the tweezer unit and operative to make and break the connection through said solenoid to secure a continuous reciprocation of said unit.

7. A hair plucking device comprising a tubular supporting member having a pair of slots formed therein at one end, a pair of hingedly connected tweezers slidably mounted within said one end of the supporting member and having a hinge pin extending outwardly at opposite ends through said slots, a solenoid mounted adjacent the opposite end of said supporting member, an operating plunger movably mounted within said tubular member and operatively connected with said tweezers to shift them toward said solenoid, there being a shoulder formed on said tubular supporting member between the solenoid and said slotted end, and spring means encircling said slotted end of the tubular supporting member and biased between said shoulder and the outer ends of said hinge pin for shifting the tweezers in the other direction.

8. A hair plucking device comprising a tubular supporting member having a pair of slots formed therein at one end, a pair of hingedly connected tweezers slidably mounted within said one end of the supporting member and having a hinge pin extending outwardly at opposite ends through said slots, a solenoid mounted adjacent the opposite end of said supporting member, an operating plunger movably mounted within said tubular member and operatively connected with said tweezers to shift them toward said solenoid, there being a shoulder formed on said tubular supporting member between the solenoid and said slotted end, spring means encircling said slotted end of the tubular supporting member and biased between said shoulder and the outer ends of said hinge pin for shifting the tweezers in the other direction, and means encircling the end of the slotted portion of the tubular supporting member and cooperating with the hinge pin of said tweezers to prevent the latter from being forced out of the tubular supporting member by said spring.

9. A hair plucking device comprising, in combination, a tubular supporting member, a solenoid disposed about and supported on said tubular member adjacent one end thereof, a pair of slidably mounted tweezers disposed for movement within the other end of said tubular supporting member, plunger means operatively connecting said tweezers with said solenoid whereby energization of the latter shifts the tweezers in one direction, spring means mounted exteriorly of said tubular member for forcing the tweezers in the other direction, controlling switch mechanism carried by said tubular member adjacent said spring means, and a substantially cylindrical casing closely embracing said solenoid and enclosing said switch means and the tweezer end of said tubular supporting member, said cylindrical casing including a portion of reduced diameter at the tweezer end of the device and having an opening therein, said switch mechanism including an operating projection extending outwardly through said opening.

10. A tweezers comprising a pair of gripping jaws, means for closing said jaws and for moving said jaws bodily rearwardly while in closed position, said means including an electric solenoid having an operating plunger, and a second plunger coaxial with said first plunger and operatively associated with said solenoid for counter-balancing said first plunger.

11. A tweezers comprising a pair of gripping jaws, means including an electric solenoid for closing said jaws and for moving said jaws bodily rearwardly while in closed position, means actuated by the movement of said jaws bodily for making and breaking the circuit through said solenoid, said last means comprising a pair of contacts, one normally urged into contact with the other, and an insulating interrupter member movable between and electrically disconnecting said contacts by the bodily rearward movement of said jaws.

12. A tweezers comprising a tubular member

provided with slots, a pair of gripping jaws mounted for sliding movement in said tubular member, a pivot pin pivotally connecting said jaws and projecting at its ends through said slots, electric solenoid means including a plunger, means on said plunger for closing said jaws, said solenoid means being operable to retract said jaws inwardly while in closed position, and a spring surrounding said tubular member and engaging the projecting ends of said pivot pin for projecting said jaws outwardly upon completion of the inward retraction of the jaws.

BRUNO WEHMER.