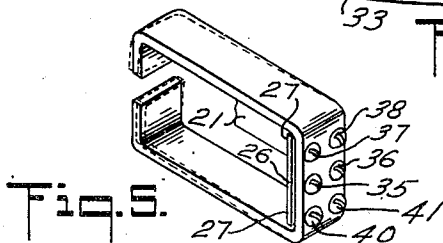
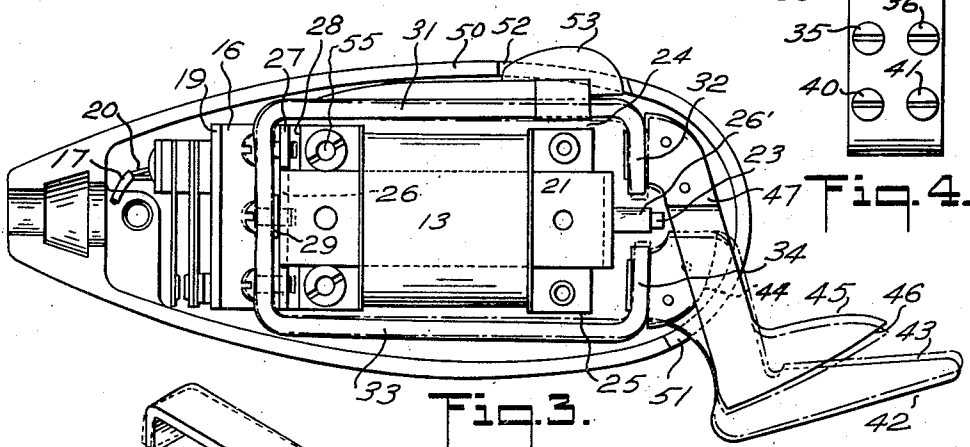
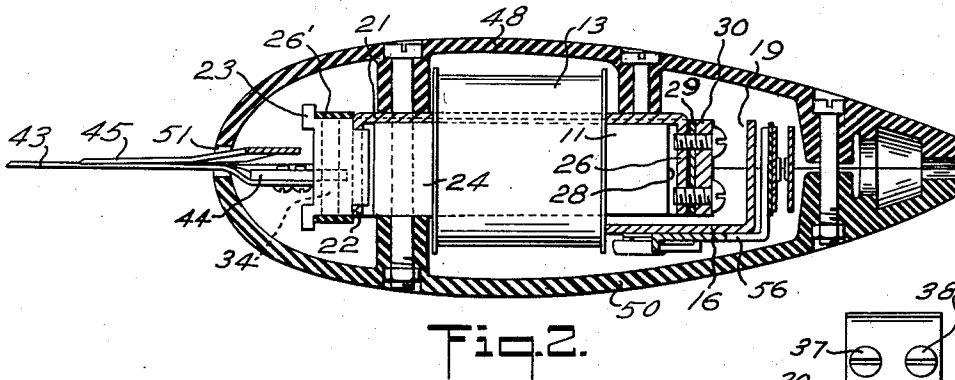
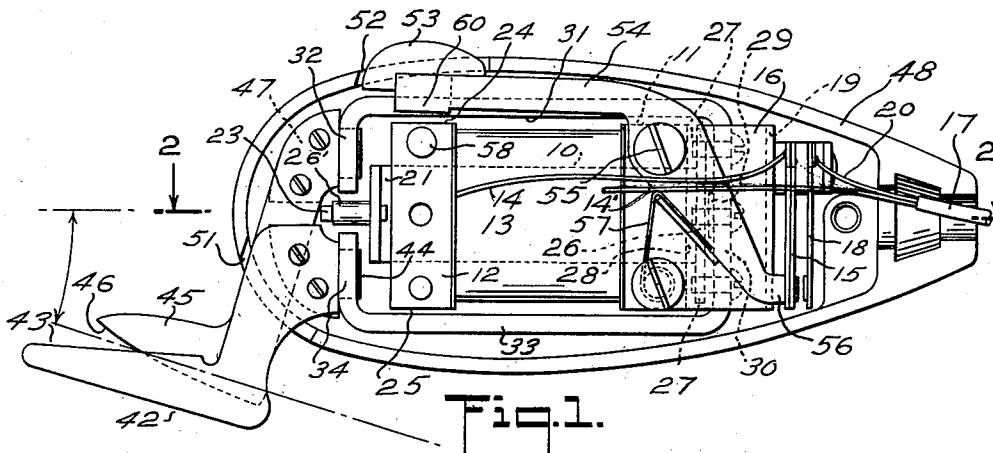


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ELECTRIC SCISSORS
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ELECTRIC SCISSORS

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5 Claims. (Cl. 30-228)

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This invention relates to electric scissors, and particularly to those of the vibratory type, wherein the blades shear as functions of the cycles of alternative current fed to the scissors, for cutting cloth and the like.

Electric scissors as previously constructed for commercial purposes have been open to certain criticisms, one of which was the fact that but one of the two shearing members or blades was actuated by the alternating flux in the instrument, while the other shear element or blade was passive and stationary relative to which the first shear element moved. This reduced the cutting rate. Another disadvantage was the relative inability either to establish, or later to reestablish, proper lateral and angular relations between the shear elements or blades, so that the initial setting of the blades was also the fixed final setting of the blades regardless of wear or of accident to the blades, such as to cause bending thereof. Other disadvantages included the unfortunate angle necessarily produced between the hand of the operator holding the device and the blades thereof, which made use of the scissors an uncomfortable matter, and the weight and excessive vibration of such scissors were objectionable.

It is among the objects of this invention: to improve the art of electric scissors; to produce an electric scissors of extreme economy of production and of lightness in weight; to provide an electric scissors which is small, compact and powerful in its cutting efficiency; to provide an electric scissors in which both blades are vibrated in complementary shearing relation relative to each other; to provide an electric scissors with blades which in vibrating damp each other to reduce the vibrational effects of the device; to provide an electric scissors with simple adjusting means by which the blades can be adjusted in torsion as well as in angular disposition; to provide an electric scissors which has a simplified control device; to overcome the disadvantages of the prior art; and many other objects and advantages will become more apparent as the description proceeds.

In the accompanying drawings forming part of this description:

Fig. 1 represents a side elevation of the scissors with one handle member removed to show the interior and working parts therein.

Fig. 2 represents a transverse horizontal section through the device shown in Fig. 1, taken on line 2-2 thereof.

Fig. 3 represents a side elevation of the device of Fig. 1, from its other side with one side mem-

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ber removed, showing in full lines the retracted blade position and in dotted lines the position at the end of the shearing power stroke.

Fig. 4 represents an end elevation of the mounting and adjusting portion of the generally U-shaped spring armature member.

Fig. 5 represents a detailed perspective of the spring armature device of the assembly showing in dotted lines two of the adjustments derivable from the screws or the like in the back portion thereof.

The scissors unit comprises a laminated core element 10, having lateral enlargements at each end comprising pole or field pieces as at 11 at the rear, and 12 at the front of the scissors. A coil 13 comprised of a suitable plurality of turns is wound on the core for developing magnetic flux, which, in its alternations, rhythmically energizes and deenergizes the core element 10 and hence the pole or field pieces 11 and 12 with alternate polarities. A lead wire 14 extends from one end of the coil to an insulated flexible contact-making and breaking element 15, mounted at the rear of the scissors on the lateral extension 19 of a plate 16, fastened to the side of the rear enlargement 11 of the core 10. The return wire 14' leads from the coil directly into the common cable 17 leading out of the rear of the instrumentality. A second flexible contact making and breaking element 18 is also insulatedly mounted on the plate 16, in juxtaposition to the first contact element 15, and the other lead 20 from the cable 17 is attached thereto. It will be understood that the cable 17 is to be attached to a suitable plug-in device, not shown.

The assembly of coil and core just described exclusive of the contact-making elements and their support, constitutes a main frame of the scissors to which all other parts and the enclosing case are attached.

A supporting plate 21 is mounted on the side of the rear field piece 11, and has a front end 22 extending laterally across the center of the front field piece 12, which end extension carries a median forwardly extending plate 23, transverse of and symmetrically between the upper face 24 and the lower face 25 of the front field piece, and preferably carries a resilient cushion, illustratively comprising a rubber band, or the like, 26', as a damping element. At its rear end, the plate 21 has a laterally extending terminal portion 26. The latter carries ears 27 extending parallel to and in slightly spaced relation to the rear face 28 of the rear field piece 11 of the core 10.

The armature device and support for the shear

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blades comprises a modified generally U-shaped resilient member comprising, in the views illustrated, a vertically disposed rear planar portion 30 comprising the transverse connection of the U, an upper arm 31 generally perpendicular to the portion 30, and a depending front extension 32 on arm 31, generally parallel to the planar portion 30. At the lower end of the rear planar transverse connection portion 30 merges into the generally perpendicular lower arm 33, which latter has an upwardly projecting front angular extension 34. The vertical central connecting portion 30 is preferably provided with suitable apertures arranged in vertically spaced pairs, each pair of which is disposed in a line transversely of the vertical portion 30, and in registry with suitable juxtaposed apertures in the plate 27 above and below the center, and at the center with apertures disposed in the angular extension 26 of the supporting plate 21, in order to receive the anchoring and adjusting screws to be described.

The U-shaped spring element just described is assembled laterally upon the electro-magnetic frame assembly described, so as to substantially completely enclose same on the rear and top and bottom, as well as partially on the front thereof. In this position a left hand set screw 35 and a right set screw 36 are caused to enter the central apertures of the planar plate portion and into the aligned apertures in the washer 29 and plate 26 between it and the end of the core member, to anchor the plate to the frame. As this anchoring means is symmetrical between vibrating members, it is practically at a node point which is substantially free from vibrations and thus minimizes the degree of vibration of the entire assembly and enhances both the life thereof and the comfort in using the instrumentality. As thus assembled the opposite spring arms 31 and 33 incline away from each other at the front due to the initial shaping and resilience of the armature unit prior to assembly with the frame. A left hand screw 37 and a right hand screw 38 are then attached through registering apertures in the common plate 30 and the adjacent ears 27 vertically between the central anchor and arm 31, and these are tightened so as to bring the free end 32 of arm 31 downwardly toward the abutment 26' in the center of the front of the unit. This brings arm 31 into proper spacing from field pieces 11 and 12. Similar screws 40 and 41 are secured in the registering apertures of the common plate 30 adjacent to the other arm 33 of the pair of resilient arms, and these are also suitably tightened in adjacent ears 27 to bring the free end 34 of armature 33 into close adjacency to the abutment 26' and with the armature 33 properly spaced from the field pieces. It will be seen that as the tightening of the respective pairs of set-screws 37 and 38, and 40 and 41 is against the resilience of the respective side arms 31 and 33 of the U-shaped unit relative to a median anchor point, close control of the angular relationships of the two spring arms relative to the pole pieces is secured. It will also be seen that a differential tightening of the screws of either of the last two mentioned pairs against the resilience of the respective arms will exert an effective twisting of the arms 31 or 33, to cause any desired relative misalignment or angular deviation of the confronting front angular portions 32 and 34 respectively, so that blades carried thereby are caused to change their relative angular resilient mutual engagement.

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One blade of the assembly comprises the lower footed element 42, preferably, although not necessarily, carried by the lower spring arm 33, and which, preferably, is the lowermost blade of the assembly, having the upwardly presented cutting edge 43, mounted on the upstanding angular extension 34 of the spring arm 33, as by means of an anchoring plate 44, mounted on and extending forwardly perpendicularly from the extension 34. The cooperating blade 45 has the downwardly presented cutting edge 46, and is preferably mounted on the depending portion 32 of the upper arm 31 by means of supporting plate 47 perpendicular to that portion.

If desired, the blades can be reversed so that the lower element 42 is mounted on the upper spring arm 31, while the upper blade 45 can be mounted on the lower arm 33, so that the shear blades can be alternately connected so that they will cut either when the armatures are drawn to the magnet or when they are released.

On suitable studs on the core element, side plates 48 and 50 comprising the housing or casing are attached to enclose the assembly, except for a small slot 51 in the front through which the blades extend, and a small aperture 52 in the top in which a button 53 is mounted and disposed for controlling the circuit through the coil. Button 53 is mounted on the forward end of a lever 54 pivoted as at 55 to the side of the core frame assembly at the rear end thereof, and the free end 56 of the lever is disposed adjacent to the first contact-making element 15, so as to actuate same toward the second contact-maker 18 when the button is depressed by the thumb of the operator. A spring device 57 normally holds the button end of the lever up with respect to the stops 58, against which latter the side flanges 60 of the lever abut in the depressed position of the button. The resilience of the first contact-making element 15 opens the circuit when the free end 56 of the lever is withdrawn.

It will be understood that when the thumb lever, or other switch device is used to close a circuit of alternating current through the coil, the laminations of the core will be magnetized with one polarity, which will simultaneously pull both of the respective adjacent spring arms 31 and 33 toward the core pole pieces, comprised of the ends of the core although only the front pole pieces will be so placed as to have appreciable effect, and will pull the blades toward each other to cause relative shearing motion between the opposed edges 43 and 46, and to cut the material introduced or fed between the said edges. During reversal of the alternating current the springs are permitted to function to spring apart, to separate the blades, followed by reversal of the polarity of the pole pieces. Thus, as the core is magnetized a power stroke is applied to the shears, followed by a release thereof under the resilience of the spring arms. This action is indicated in Fig. 3, in which the dotted lines indicate on an exaggerated scale the relation of the blades when the spring arms are pulled in together under the action of the magnetic flux, and the full line position indicates the separation of the blades under the resilience of the spring arms. As noted, under certain conditions this can be reversed so that the cutting stroke will be as a function of resilience instead of magnetic attraction if desired, while still maintaining the simultaneous actuation of both blades.

It will be understood that with the adjustment

provided the lateral pressure between the blades is easily and readily adjusted by varying the differential adjustments of the pairs of screws 37 and 39, and of 40 and 41. It will also be clear that the relationship of either arm 31 or 33 to the pole pieces of the core can be selectively varied, so that the motion can be either the symmetrical motion of both blades to the same degree as disclosed, or to an asymmetrical motion of both blades, by permitting one to have a closer relationship to the pole piece and therefore a stronger pull and motion than the other, and finally so that one can be prevented from moving at all, and the blade associated therewith becomes a stationary anvil relative to which the other vibrates.

It will be clear that the provision of the rubber cushion 26' serves to absorb the excess vibrations of the two spring arms by permitting the ends of the angular extensions 32 and 34 to abut same at the end of their respective power strokes, and that the degree of damping thus secured can be varied by adjusting the respective pairs of adjusting screws 37 and 38, and 40 and 41, to bring the ends of the respective spring arms closer to or further from the damping cushion 26'.

The line bisecting the overlapping blades in their shearing relation is acute to the longitudinal axis of the entire instrumentality and thus secures a comfortable position for the hand of the operator grasping the instrumentality with reference to the work, as indicated in Fig. 1.

The cheapness, lightness, compactness, and neatness of the assembly thus provided will be clear as will the fact that it is rugged, susceptible to minute adjustments so as to compensate for wear, and that it is extremely powerful in its cutting action, especially in view of the fact that the cutting stroke in the preferred form is the power stroke in place of the rebound stroke.

Having thus described my invention, I claim:

1. An electric scissors, comprising an electromagnetic unit formed of a coil, a laminated core operatively associated with the coil, and a pair of resilient armature arms of substantially identical masses, a backing plate integral with the resilient arms, means for mounting the backing plate in anchored relation to the core with the arms overlying said core for synchronous actuation thereby, means operative between the anchor and the resilient part of the arm for moving the arm against its resilience to an adjusted operative position relative to the core, a blade having an edge, means operatively associated with one arm for mounting said blade, a second blade having an edge, and means for mounting the second blade on the other arm, with the respective edges in crossed relation, said adjusting means comprising a pair of spaced screw devices arranged for differential vertical and lateral adjustment of the blades.

2. An electric scissors, comprising an electromagnetic unit comprised of a core and a coil, a double resilient member substantially enclosing said core and comprising a generally U-shaped member having side arms forming armatures and a transverse connection, means for anchoring the device relative to said core so that the side arms of the U-shaped member overlie the core, crossed blades mounted for movement with the free ends of the armatures, said anchoring means being substantially symmetrically disposed in the transverse connection between the

side arms, and means on opposite sides of the anchor for forcing the armature arms toward the core against their respective resiliences.

3. An electric scissors, comprising an electromagnetic unit comprised of a core and a coil, a double resilient member substantially enclosing said core and comprising a generally U-shaped member, bent from a single strip of steel, having side arms forming armatures and a transverse connection, means for anchoring the member relative to said core so that its side arms overlie the core, crossed blades mounted for movement with the free ends of the side arms, said anchoring means being substantially symmetrically disposed in the transverse connection between the side arms, means on opposite sides of the anchor for forcing the armature arms toward the unit against their respective resiliences and for laterally adjusting the blades with respect to each other.

4. An electric scissors comprising a generally U-shaped member formed of generally parallel spaced arms having free ends with opposite ends of the arms joined by a transverse connection extending between the arms, a frame, means attaching the connection to the frame at a point dynamically symmetrical between the spaced arms, a blade mounted on the free end of one arm and extending therefrom away from the connection and having a shearing edge, a second blade mounted on the free end of the other arm juxtaposed to the first blade and extending from said free end of said other arm away from the connection, said second blade having a shearing edge extending across the shearing edge of the first blade in shearing relation thereto, supplemental means adjacent to said point for varying the physical relationship of said arms to the frame by pressure between the frame and said connection, and an electromagnetic unit mounted on the frame and straddled by said arms, said arms comprising armatures for the unit.

5. An electric scissors as recited in claim 4, wherein said supplemental means is disposed between the first means and a side arm and comprises a pair of pressure-varying devices spaced laterally on opposite sides of the longitudinal center line of the connection extending between the frame and the connection for predeterminedly varying the physical relationship of the connection and frame both angularly and in torsion to respectively vary the point of crossing of the respective shearing edges and to modify the pressure relation between said blades.

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