

July 2, 1940.

C. M. HARTER

2,206,697

ELECTRIC FOIL

Filed June 23, 1938

2 Sheets-Sheet 1

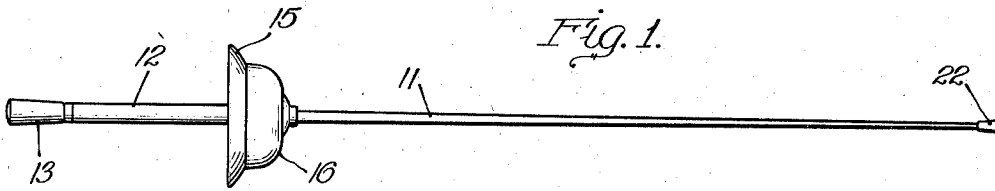


Fig. 1.

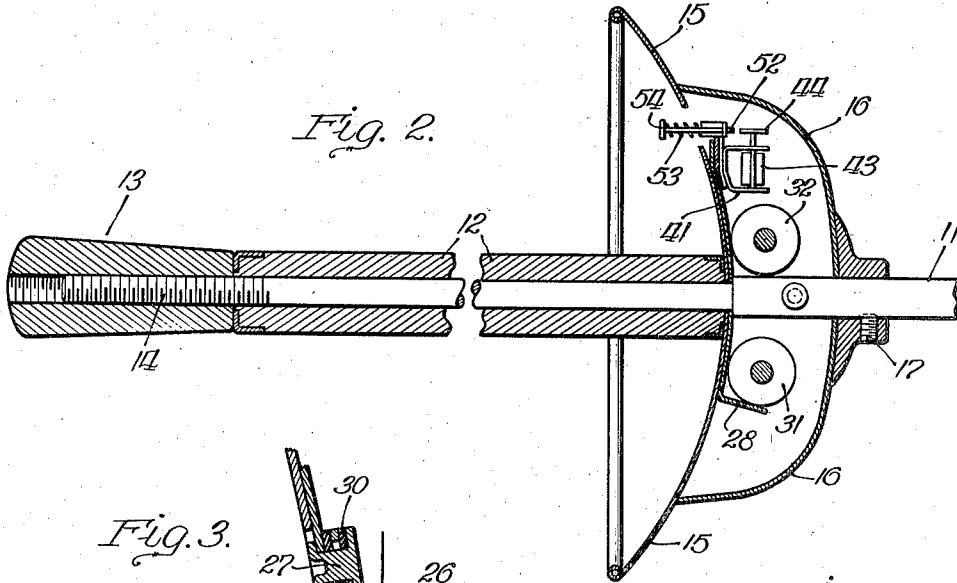


Fig. 2.

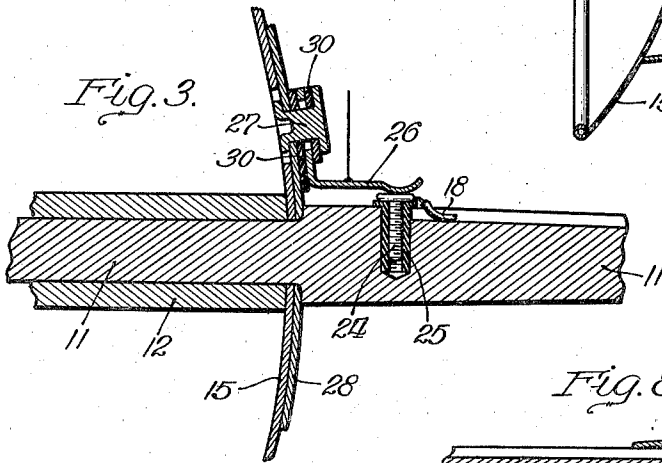


Fig. 3.

Fig. 7.

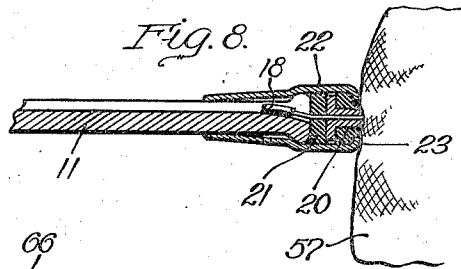
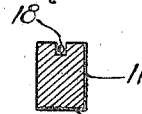


Fig. 8.

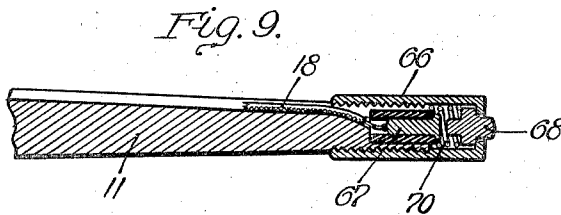


Fig. 9.

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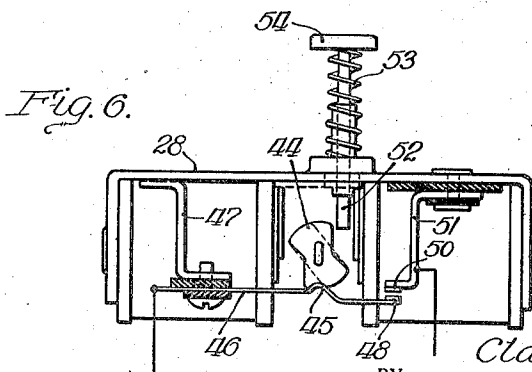
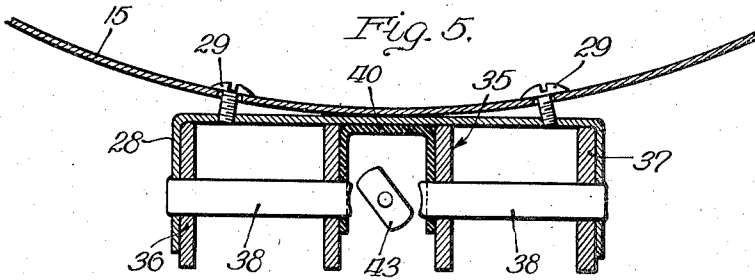
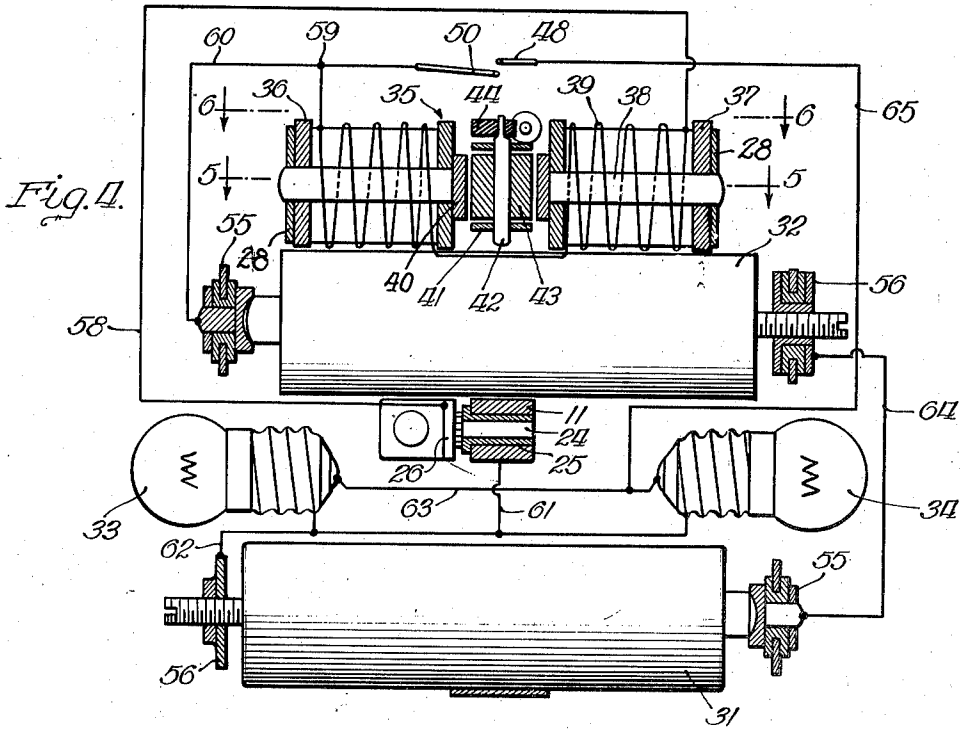
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ELECTRIC FOIL

Filed June 23, 1938

2 Sheets-Sheet 2



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# UNITED STATES PATENT OFFICE

2,206,697

## ELECTRIC FOIL

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Application June 23, 1938, Serial No. 215,511

6 Claims. (Cl. 272—57)

The invention relates to the art of fencing and has more particular reference to an improved type of foil for use in the conventional game of fencing or in épée.

An object of the invention is to provide an improved foil having electric means which will automatically register a touch on the vulnerable target of the opponent in contest.

Heretofore it has been the common practice in fencing contests to have one or more judges who call the touch or score and owing to the extreme quickness and speed of the foil in the hands of an expert fencer, it is frequently difficult for the judges to determine whether a touch has been made or not and accordingly, the judges very often disagree. In épée the same general conditions exist except that the rules and regulations of the two games are quite different.

In the conventional game of fencing, only a certain portion of the opponent's body, namely, from the waist line to the shoulders, is considered the target. Any touch that may be made on the opponent, except on the vulnerable target portion of his body, does not score. Frequently it is difficult for the judges to determine whether the foil actually touched the target or perhaps some other part of the body. Therefore, in one embodiment of my invention I provide a metallized jacket to be worn by each of the contestants and which covers only the target portion of the body. In this embodiment of the invention the improved foil is provided with electrically energized means having contacts at the tip of the foil so that when said tip touches the metallized target an electric circuit will be closed, actuating means in the bell of the foil which visibly registers the touch. The indicating means, which consists of a small electric bulb, remains lighted until it is switched off by the contestant and in order that the judges and also the spectators may clearly see the lighted bulb, the bell of the foil may be made of a transparent material, or if a metal bell is used, the same may be perforated so that the light within may be easily seen.

As an alternative arrangement, the electric means and bulb may be located in the helmet of the contestants and connected to the electric circuit in the foil by means of small flexible electric conductors, but it is considered more convenient for general practice when located adjacent to the bell of the foil.

In épée the metallized jacket is not used as any part of the opponent's body is considered as target. In this embodiment of the invention

the tip of the foil is provided with a pressure operated contact switch so arranged that any pressure on the end of the tip will close the electric circuit and visibly register the touch by lighting the electric bulb in the bell of the foil.

It is therefore another object of the invention to provide a foil for use in the conventional game of fencing or for use in épée which will incorporate self-contained means for visibly or audibly indicating a touch on the vulnerable target of the opponent in contest.

Another object of the invention resides in the provision of means in the bell of a foil for visibly registering a touch and which will continue to be visible until manually turned off by the contestant handling the foil.

Another object is to provide an improved type of foil having electric means in the bell thereof for visibly indicating a touch and which means will be energized by batteries also located within the bell of the foil.

With these and various other objects in view, the invention may consist of certain novel features of construction and operation, as will be more fully described and particularly pointed out in the specification, drawings and claims appended hereto.

In the drawings which illustrate an embodiment of the invention and wherein like reference characters are used to designate like parts—

Figure 1 is an elevational view of a foil embodying the improved features of the invention;

Figure 2 is a sectional view of the handle portion of the foil showing the location of the electric indicating means in the bell thereof;

Figure 3 is a fragmentary sectional view of the handle and bell showing the contact for the insulated conductor;

Figure 4 is a plan view of the principal parts of the visible indicating mechanism and the electric circuit connecting the parts;

Figure 5 is a sectional view taken substantially along line 5—5 of Figure 4 and showing the sectional relay with balanced armature;

Figure 6 is a sectional view taken substantially on line 6—6 of Figure 4 and showing the circuit closing mechanism of the relay;

Figure 7 is a sectional view taken transversely through the blade of the foil showing the location of the insulated wire within said blade;

Figure 8 is an enlarged sectional view of the tip end of the foil showing the same in engagement with a metallized jacket; and

Figure 9 is a sectional view showing a modi-

fied form of tip having pressure actuated contact means.

Referring to the drawings, particularly Figures 1 and 2, the numeral 11 indicates the blade of the foil which is provided with a handle comprising the removable portions 12 and 13, the latter portion being threaded to the end 14 of the blade to thereby retain the portion 12 in contact with the guard 15 of the foil. A second guard or bell 16 is associated with guard 15, being releasably secured to the blade by the set screw 17. The bell provides a cover for the electric mechanism including the relay and batteries and may be easily removed in case it is necessary to repair the electric mechanism or replace worn out batteries with new ones. The bell may be transparent or may be formed of metal and perforated in order to render the electric bulb visible and which when lighted forms the visible indicating means.

The blade 11 of the foil on one side thereof is provided with a groove extending from the guard to the tip end and within which is located an insulated wire 18, Figure 7. The said wire at the tip end is electrically connected to a center contact 20 insulated by part 21 from the metal tip portion 22. Said portion 22 has inwardly directed bent ends 23 which are spaced from the center contact 20. The other end of the metal tip portion is suitably secured to the blade and therefore has electrical connection with the blade although insulated, of course, from wire 18. Said wire 18 at its opposite end electrically connects with contact screw 24, which is mounted in but insulated from the blade 11 by the part 25. The flat spring 26 contacts the screw 24 and is suitably secured at its other end by the rivet 27 to the part 28. Said part 28 is secured to the guard 15 of the foil by screws 29, as shown in Figure 5, and provides a support for the relay and the other electrical mechanism of the invention. The insulating washers 30 insulate the flat spring 26 from the support 28 to which it is secured.

Referring more particularly to Figures 2 and 4, the structure located under bell 16 comprises dry cell batteries 31 and 32 for supplying current to the electric bulbs 33 and 34 and to the relay designated in its entirety by numeral 35. Said relay comprises two sections 36 and 37, each section including an iron core 38 around which is wound many turns of fine wire 39. The inner ends of the iron core 38 are connected by magnetic yoke 40. A support 41, positioned between sections 36 and 37 of the relay, journals shaft 42, to which is fixedly secured a balanced armature 43. Said armature is therefore mounted to rotate with respect to the pole pieces 38 of the relay.

On one end of shaft 42 is fixed a cam 44 made of fiber or other insulating material and which cam is provided with a notch for receiving the bent portion 45 of the flat spring 46. At one end said flat spring is secured to but insulated from support 47. At its other end the flat spring is provided with contact 48 positioned for engagement with contact 50 secured to support 51. The said support is insulated from part 28 which supports plunger 52 positioned to engage cam 44 for the purpose of rotating the cam clockwise. When so rotated the cam is brought into relation with and held by the bent portion 45 of the flat spring 46. A coil spring 53 surrounds the upper end of the plunger and yieldingly maintains the same in raised position, thus requiring the operator to press on the handle 54 to depress the

plunger. When the cam 44 is held by the bent portion 45 of the spring 46 the contacts 48 and 50 are separated.

Referring to Figure 4, it will be observed that the batteries 31 and 32 are each supported from the part 28 by positive and negative terminal posts 55 and 56, respectively. When the contacts 48 and 50 are separated the armature 43 is diagonally positioned, as shown in Figure 5. Assuming that the foil is in use and a touch is made upon the metallized jacket 57 of an opponent, Figure 8, the electric circuit to the relay 35 will be closed through contacts 20 and 22. Contact 22 is of course grounded to the blade 11 and the center contact 20 includes the insulated conductor 18, the screw 24 and the flat spring 26. The conductor 58 electrically connects said flat spring to one end of wire 39 of the relay. The other end of wire 39 is connected at 59 to conductor 60 leading from the contact 50 and which connects with the positive terminal 55 of battery 32.

In Figure 4 the blade 11 is shown as connected with the screw shell of the electric bulbs 33 and 34 by conductors 61 and 62. Actually these conductors comprise the ground connection from the blade 11 to part 28 and through the sockets into which the bulbs 33 and 34 are screwed. The center contacts of said bulbs are connected by conductor 63. Conductor 62 has connection with the negative terminal 56 of battery 31 and the positive terminal of said battery is connected by conductor 64 with the negative terminal of battery 32, thus completing the electric circuit to the relay. From the foregoing it will be understood that when a touch is made and the contacts 20 and 22 are closed the relay will be energized to cause rotation of the armature 43, which rotation will take place in a counter-clockwise direction, Figure 6, and against the tension exerted by spring 46 on cam 44. When said cam has been rotated to remove the bent portion 45 from the notch in said cam the contacts 48 and 50 will engage and the circuit to the electric bulbs 33 and 34 will be closed, thereby visibly indicating a touch has been made. This circuit will now be explained.

The positive terminal 55 of battery 32 connects with contact 50, and contact 48 through conductor 65 joins with conductor 63 which connects the center terminals of the electric bulbs. The current travels through the filament of the bulbs and from the threaded shell thereof to conductor 62, which, as previously described, diagrammatically represents the ground connection and which joins with the negative terminal 56 of the battery 31. The positive terminal of said battery joins with the negative terminal of battery 32 and thus the circuit is completed, causing the electric bulbs to light.

In accordance with the invention, the parts will remain as above described and the bulbs will remain lighted until manually turned off by the contestant. To accomplish this it is necessary to rotate cam 44 counter-clockwise, which is accomplished by depressing plunger 52, which rotates the cam in the proper direction and again brings the same into engagement with the spring 46. The circuit to the bulbs is thus automatically broken at contacts 48 and 50, and of course the circuit to the relay is immediately opened after a touch has been made, since the contestant naturally withdraws the foil from the metallized jacket of his opponent so as to counter any offensive thrusts made by the opponent. The operations above described, which first cause ener-

gization of the relay and then closing of the electric circuit through the battery to energize the electric bulbs, are repeated with a foil of Figure 9 having the pressure actuated means in the tip thereof. In this form of tip the grounded contact 5 66 encloses a center contact 67 normally insulated therefrom and which is connected to the insulated conductor 19 extending longitudinally of the blade 11. The contacts are closed by pressure 10 when a touch is made, which depresses member 68 normally yieldingly held in an outermost position by the coil spring 79. A foil having the modified tip described is generally used in épée since in this form of fencing any part of the opponent's body is considered as target. Any touch 15 that may be made by the contestant on the body of his opponent will force member 68 inwardly, closing the circuit and energizing the relay within the guard of the foil, as fully described in connection with the use of the metallized jacket. 20

It is to be understood that the invention is not to be limited to or by details of construction of the particular embodiment thereof illustrated by the drawings, as various other forms of the device will of course be apparent to those skilled 25 in the art without departing from the spirit of the invention or the scope of the claims.

What is claimed is:

1. In a foil for use in conventional fencing, in combination, a blade having a handle portion, a bell interposed between said blade and handle portion, an insulated conductor extending the length of the blade and terminating in a stationary contact insulated from the blade at the tip thereof, a source of electric current housed within said bell, a relay located within said bell and connected in circuit with said source of current, blade and insulated conductor, whereby closing of the circuit at the tip of the blade will energize said relay, electric indicating means within said bell and also connected in circuit with said source of current, a switch in said circuit to the indicating means, a rotatable armature associated with said relay and having rotation upon energization thereof to actuate said switch for closing the circuit to the indicating means, and manually actuated means for returning said armature to initial position whereby the circuit to the indicating means is broken. 40

2. In a foil for use in conventional fencing, in combination, a blade having a handle portion, a bell interposed between said blade and handle portion, an insulated conductor extending the length of the blade and terminating in a stationary contact insulated from the blade at the tip thereof, a source of electric current housed within said bell, a relay located within said bell and connected in circuit with said source of current, blade and insulated conductor, whereby closing of the circuit at the tip of the blade will energize said relay, electric means including an electric bulb located within said bell and also connected in circuit with said source of current, a switch in said circuit to the electric means, a rotatable armature associated with said relay and having rotation upon energization thereof, a cam rotated by said armature and having operation to actuate the switch to close the circuit to the electric means when the relay is energized, whereby said electric bulb is lighted indicating that a touch 65 has been made on an opponent, and manually ac-

tuated means including a plunger adapted to engage said cam when depressed for returning the armature to initial position whereby the circuit to the electric means is broken.

3. In a foil for use in conventional fencing, wherein each participant wears a metallized jacket covering the vulnerable portion of his body, a blade having a handle portion and a bell, a relay located within said bell, a source of current for energizing said relay, fixed and insulated contacts at the tip of said blade also electrically connecting with said relay and which normally maintain the circuit to the relay open, said circuit being closed when said contacts are brought into engagement with the metallized jacket of an opponent, electrical indicating means within said bell connecting with said source of current, a switch in said circuit to the indicating means, a rotatable armature associated with said relay and having rotation upon energization thereof to actuate said switch for closing the circuit to the indicating means, and manually actuated means for returning said armature to initial position whereby the circuit to the indicating means is broken. 25

4. In a foil for use in conventional fencing wherein each participant wears a metallized jacket covering the vulnerable portion of his body, in combination, a blade having a handle portion and a guard, an electrically energized relay, insulated contacts at the tip of said blade electrically connecting with said relay and which normally maintain the circuit to the relay open, said circuit being closed when said contacts are brought into engagement with the metallized jacket of an opponent, electrical indicating means, and means having actuation upon energization of said relay to close an electric circuit to said indicating means whereby said means will indicate each touch made on the vulnerable portion of the body of the opponent. 40

5. In a foil for use in conventional fencing, wherein each participant wears a metallized jacket covering the vulnerable portion of his body, in combination, a blade having a handle portion, an electric circuit including an insulated conductor extending the length of the blade, said insulated conductor terminating in an insulated contact point at the tip thereof and connecting with a source of electric current located between the blade and the handle portion, a relay interposed in said electric circuit and having actuation when the circuit is closed at the tip of the blade by contact with that portion of the opponent's body covered by the metallized jacket, electric means indicating each actuation of the relay, and manually actuated means for returning the relay to its original position thus opening the circuit to said electric means. 50

6. In a foil for use in conventional fencing, in combination, a blade having a handle portion, a guard interposed between said blade and handle portion, insulated contacts at the tip of said blade, and indicating means electrically connecting with said contacts whereby the circuit to the indicating means is normally open, said contacts being constructed and arranged to close said circuit through an external electrical conductor such as a metallized jacket worn by an opponent. 65