

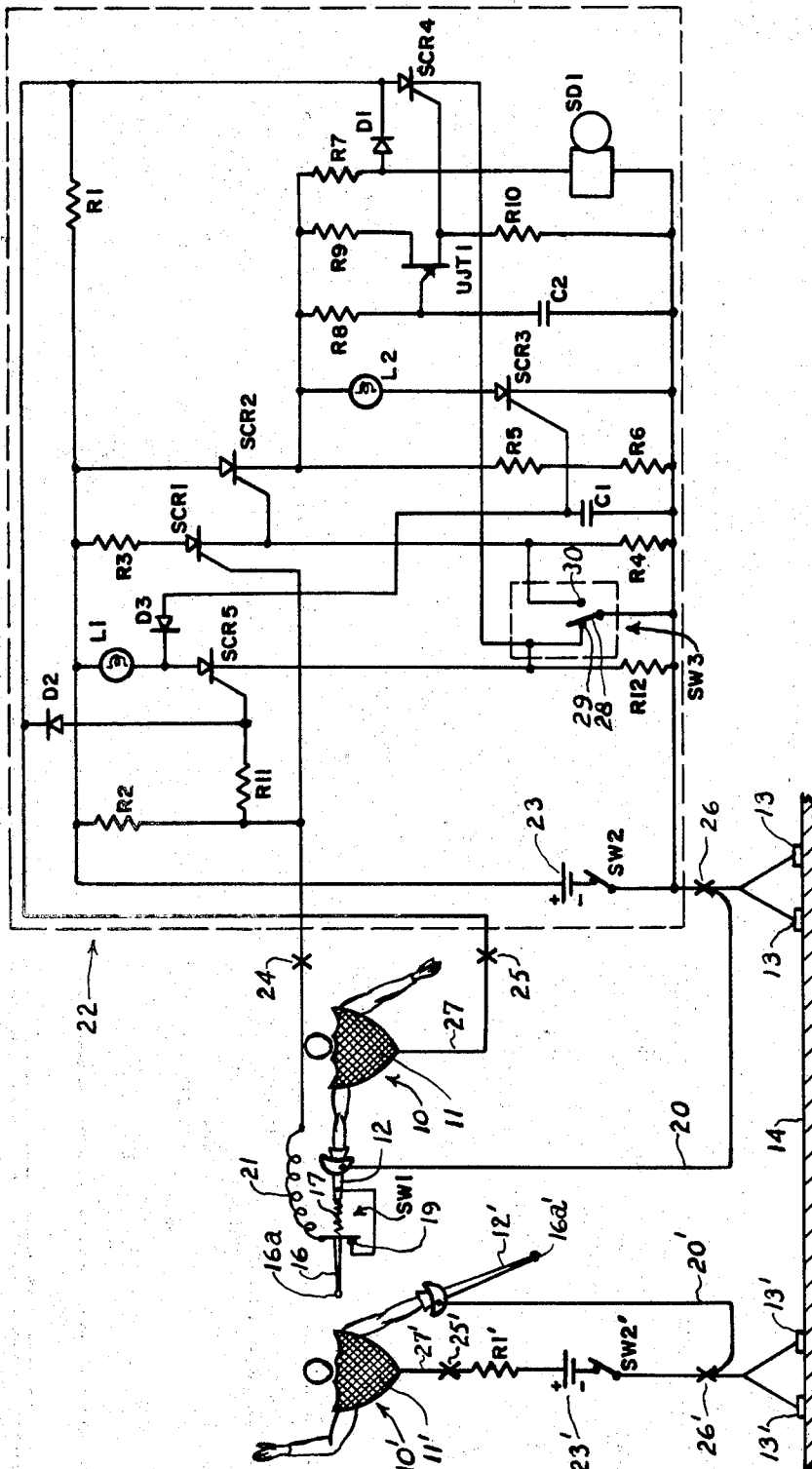
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ELECTRICAL APPARATUS FOR SCORING FENCING MATCHES

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ELECTRICAL APPARATUS FOR SCORING FENCING MATCHES

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ABSTRACT OF THE DISCLOSURE

Electrical apparatus for scoring a fencing match includes an electrically conductive floor surface, electrically conductive footgear worn by the fencers for making electrical contact with the floor surface, and a weapon, an exposed electrically conductive surface and a scoring assembly carried by each fencer. Each scoring assembly has a battery connected to the fencer's footgear, to signal devices and actuating means therefor in the scoring assembly, and to a switch on his weapon. The switch on each weapon has an exposed movable contact at the tip connected to actuating means for the signal devices in the scoring assembly of the fencer carrying the weapon so that when both fencers are on the conductive floor surface and one presses the tip of his weapon against the exposed conductive surface of the other, the battery in the other's scoring assembly is connected, through the weapon switch and through the floor surface, to actuate a fair hit signal in the scoring assembly of the one fencer. If one of the fencers presses the tip of his weapon against a nonconductive surface, the switch of his weapon completes a circuit in his scoring assembly which actuates a foul signal.

The present invention is an electrical apparatus for scoring fencing matches. This apparatus is particularly adapted for scoring fencing matches in accordance with the rules of such national fencing groups as the AAU (Amateur Athletic Union) and the AFLA (Amateur Fencer's League of America), and the principal international fencing organization, the F.I.E. (Federation Internationale d'Escrime).

In general, fencing matches are scored by counting fair hits—when one fencer touches the tip of his weapon against the torso and other selected parts of the other fencer—and registering foul hits—when one fencer touches the tip of his weapon against other parts of the other fencer's body or against other surfaces.

Electrical apparatus for scoring fencing matches is known and used at present, but conventional electrical scoring apparatus has the drawback that each fencer is connected by an electrical cable to a central scoring box having lights and buzzers which are adapted to be actuated by switches on the tips of the fencers' weapons to register fair or foul hits. The weapons may be foils, épées or other sword-type weapons. In foil fencing each fencer wears a vest or other garment having an electrically conductive surface defining the fair hit target area of his body, and each carries a body cord, which is a cable connecting his weapon and vest to a long cable to the central scoring box. The switch on each weapon has an exposed movable contact on the tip, and the switch and its movable contact are connected through the fencer's body cord and the aforesaid long cable to circuitry and electric power in the central scoring box, for causing a fair hit light and a buzzer to be actuated when the exposed contact on the switch of his weapon is pressed against the conductive surface of the other fencer. In this instance the circuit which actuates the fair hit light and buzzer bell is completed through the switch of the weapon involved, through the conductive surface of the fencer who is hit and through

the body cords attaching the respective fencers to the scoring box. The floor surface, on which the fencers tread for the match and which defines an area of permitted movement of the fencers for the match, is electrically conductive and is grounded to the scoring box so that pressing the tip of a weapon against the floor surface will not produce any response on the scoring box. The body of each fencer's weapon is also grounded to the scoring box (through the fencer's body cord and the long cable) so that pressing the tip of a weapon against the body of the other fencer's weapon also will not produce any response from the scoring box.

When one fencer presses the tip of his weapon against a nonconductive portion of the other fencer's body or against some other nonconductive surface, the movement of the switch on his weapon actuates the foul hit signal and buzzer or bell on the scoring box.

In fencing épée there are no foul hits and all hits on the body of the opposing fencer are scored as fair hits. Consequently, when using conventional electrical scoring apparatus the electrically conductive vests or other garments are not used, or are not connected to the scoring box, and the circuitry of the scoring box is arranged so that all pressures on the tips of the weapons (except pressure against the grounded floor surface) are signalled as hits.

As mentioned, however, with the above-described conventional electrical scoring apparatus the fencers have a long cable attached to them. These cables are distracting and awkward to maneuver and efforts have been made to devise suitable electrical scoring apparatus which operates without having to use external cables. For example, radio signalling devices carried by the respective fencers to send appropriate fair or foul hit signals to a central scoring receiver have been devised, but these devices have the drawback that they cannot be used near other sets of the same type of radio apparatus operating on the same frequency, since the signals from different sets become mixed and jam or improperly operate the receivers of the other sets. Consequently, two or more different radio type scoring devices operating on the same frequency cannot be used at the same time in the same area and this renders them impractical for fencing tournaments in which it is customary to have many matches being fenced at the same time in a constricted area. Moreover, such radio operated scoring devices are subject to interference from other radio frequency sources in the vicinity.

It is an object of this invention to provide electrical apparatus for scoring a fencing match which operates without cables or other awkward connections to the fencers and which utilizes direct electrical connections between the elements so that the apparatus is not subject to interference from radio waves or signals generated by other apparatus operating close by.

Another object is to provide electrical scoring apparatus which is particularly adapted for scoring foil fencing in accordance with the most widely applied sets of official rules of national and international fencing organizations, which is readily adapted to comply with modifications which may be made in the rules, and which may be modified without great expense or difficulty for scoring épée fencing in accordance with current épée fencing rules.

A further object is to provide apparatus which utilizes some of the important items of equipment—namely, foils with switches, vests with exposed electrically conductive surfaces, body cords with connectors, and floor mats or strips which have electrically conductive surfaces—which are used in current electrical scoring apparatus of the type described above that is widely used in national and international fencing tournaments and in fencing clubs. Thus, for clubs, organizations and individuals hav-

ing current electrical scoring equipment and personal equipment, such as foils, body cords, and vests, for use therewith, the apparatus of this invention does not require complete replacement of their present equipment, but merely involves acquiring some supplemental equipment, such as scoring assemblies (described below), electrically conductive footgear, and cables for connecting the footgear of a fencer to his scoring assembly which he carries.

Apparatus in accordance with the present invention, for electrically scoring fencing matches includes an electrically conductive floor surface of the type currently in use in conventional electrical scoring apparatus, vests of a conventional type having electrically conductive surfaces, and foils or other sword-type weapons of conventional electrical types, each of which has a known form of switch thereon.

In the latter form of switch a movable contact is electrically conductive and exposed at the tip of the weapon to be pushed back out of engagement with a fixed contact in the switch when the exposed end is pressed. In addition, the apparatus includes footgear, with at least the sole portion being electrically conductive, to be worn by the fencers for making electrical contact with the conductive floor surfaces, scoring assemblies adapted to be carried by the respective fencers, and wires or cables from the footgear of each fencer to his scoring assembly. Each scoring assembly includes a battery, signal devices for indicating fair or foul touches and electrically operated means for actuating them. One pole of the battery in each fencer's scoring assembly is connected to the exposed conductive surface of his vest, or other garment. The other pole is connected to his footgear. The means for actuating the fair touch signal device in each scoring assembly is electrically connected between the respective fencer's footgear and the switch of his weapon in a manner to be operatively connected to the battery in the other fencer's scoring assembly (thereby to actuate the fair touch signal in his scoring assembly) when he presses the tip of his weapon against the exposed conductive surface of the other fencer, while both are treading on the conductive floor surface, which completes the circuit. The foul touch signal device actuating means in each fencer's scoring assembly is connected between his footgear and the battery in his own scoring assembly and to the switch member of his weapon so as to be operated to actuate the foul signal device when he presses the tip of his weapon against a non-conducting surface, or if he presses the tip of his weapon against the conductive surface of the other fencer and one or the other of the fencers is not on the conductive floor surface.

Further objects, advantages and features of the apparatus of this invention will be apparent from the following detailed description of an illustrative embodiment shown in the accompanying drawing, which is a schematic diagram including a complete circuit diagram of the scoring assembly of one fencer, indicating two fencers treading on a conductive floor surface and showing part of the operative electric circuit of the scoring assembly carried by the other fencer.

In the drawing two fencers, indicated at 10, 10' respectively, wear garments, such as vests, having electrically conductive surfaces 11, 11', carrying foils or other fencing weapons 12, 12', and wear electrically conductive footgear 13, 13' for making electrical contact with an electrically conductive floor surface 14 when the fencers are treading thereon, as shown.

In the description herein elements which are duplicated in the equipment of each fencer and which appear in duplicate in the drawing are designated by a plain number in the equipment of one fencer, while the duplicate elements shown in the equipment of the other fencer are designated by the prime of the same number. It is also to be understood that a duplicate of equipment de-

scribed below as being carried or worn by fencer 10 is carried or worn by fencer 10'.

The weapons, illustrated schematically by the weapon 12, each have a switch SW1 in which an electrically conductive contact 16 is mounted to be movable against the pressure of a spring 17. The movable contact 16 has an exposed end 16a forming the tip of the weapon 12; it is insulated from the body of the weapon 12, which is electrically conductive, and is normally biased into engagement with a fixed contact 19 in the switch SW1 by the spring 17. When the tip of the weapon 12 formed by end 16a is pressed against the body of the opposing fencer, or is otherwise pressed, the movable contact 16 is disengaged from the fixed contact 19. The body of the weapon 12 is connected through a conductor 20 to the footgear 13 of fencer 10 and, as indicated, the fixed contact 19 is connected to the body of the weapon, and hence to the footgear 13. The movable contact 16 is connected through a conductor 21 to the circuitry of a scoring assembly 22 (enclosed in dash lines in the drawing) which is carried by the fencer 10. Thus, in the normal position of the movable contact 16 it connects the conductor 21 to the footgear 13 of fencer 10 through the fixed contact 19 and conductor 20, but when the movable contact 16 is pressed it disconnects the conductor 21 from the footgear 13.

Conductor 20 to the footgear 13 and conductor 21 to scoring assembly 22 are normally adapted to be under the outer clothing of the fencer.

Two scoring assemblies, illustrated by scoring assembly 22 in the drawing, are carried respectively by the fencers 10, 10' and are therefore made as small and compact as possible, preferably by utilizing solid state and miniature circuit elements wherever possible, so as not to interfere with the movements of the fencers. They are self-contained and may be strapped to the backs, or around the waists, of the fencers or are otherwise carried by the fencers in any convenient manner.

As illustrated by the scoring assembly 22, each of them includes a battery 23 as a source of electric power for operating the elements of the assembly, a fair hit signal light L1, a foul hit signal light L2, a sound producing device SD1, and circuit components connected for actuating the lights L1 and L2 and the sound producing device SD1. As shown, these circuit components suitably include five SCR's (silicon controlled rectifiers), SCR's 1 to 5, twelve resistors, R's 1 to 12, two capacitors, C1 and C2, a unijunction transistor, UJT1, three diodes, D1, D2 and D3, a circuit switch, SW2, and a reset switch SW3.

As indicated, the scoring assembly 22 is connected through three connectors 24, 25 and 26 (indicated by X's) respectively to the conductor 21 to the movable contact 16 of switch SW1, to a conductor 27 to the electrically conductive surface 11, and to the footgear 13, which connects the scoring assembly 22 and the body of the weapon 12 to the conductive floor surface 14 when the fencer 10 is standing thereon. The connectors 24, 25 and 26 are suitably a pin and socket type which are readily disengaged and engaged for disassembling and assembling the apparatus.

The negative poles of the batteries 23, 23' of the respective scoring assemblies are connected through connectors 26, 26' to the footgear 13, 13' so that with both fencers treading on the conductive floor surface 14 the latter surface provides a common ground potential for both scoring assemblies, as well as for the weapons 12, 12'. Circuit switches SW2, SW2' may be provided between the batteries 23, 23' and the connector 26 to be opened for preserving the batteries when the apparatus is not in use.

The positive poles of the batteries 23, 23' are connected through resistors R1, R1' through connectors 25, 25' and through conductors 27, 27' to the exposed electrically conductive surfaces 11, 11' of the fencers 10, 10', respectively.

The drawing shows the scoring assembly 22 and the weapon 12 in the rest position in which the movable contact 16 of switch SW1 of weapon 12 is in contact with the fixed contact 19 so that the conductor 21, through movable contact 16 and through conductor 20, is connected to the footgear 13. This grounds the conductor 21 to the common ground provided by the conductive floor surface 14 when the fencer 10 is treading on the floor surface 14. In this rest position the gate electrodes of the SCR's 1-5 are effectively at the ground potential so that the SCR's are nonconductive. An SCR is shut off (switched to its nonconductive state) when its gate electrode is more negative than its cathode electrode and it is maintained in its nonconductive state as long as its gate electrode is at about the same potential as, or more negative than, the cathode electrode. Conversely, an SCR is switched to its conductive state by applying a relatively positive charge to its gate electrode so that the latter is momentarily, at least, more positive by a predetermined extent (determined by the characteristics of the particular SCR) than the cathode electrode. Thereafter, the SCR remains in its conductive state until power is applied to render its gate electrode more negative than its cathode electrode.

In the circuits of the scoring assembly 22, illustrated in the drawing, the application of power to the gate electrodes of the SCR's is controlled by the operation of the weapon switch SW1. The anode electrodes of the SCR's are connected to receive positive power from the battery 23, their cathode electrodes are connected to the negative side of the battery 23, and the various resistances are arranged and balanced in the circuits so that the SCR's are maintained in their nonconductive states while the apparatus is in the illustrated reset position. In the drawing the reset switch, SW3, is shown in its normal position ready for operation of apparatus; its operation when switched to its reset position is subsequently described.

With weapon 12 in the rest position, there is a short circuit between connectors 24 and 26 of scoring assembly 22 through line 21, movable contact 16, fixed contact 19, weapon 12, and line 20. When fencer 10 actuates switch SW1 by pressing it against the conductive body of weapon 12' or against the conductive floor surface 14, a short circuit is maintained between connectors 24 and 26 through line 21, exposed movable contact 16a, weapon 12', conductor 20', footgear 13', conductive floor surface 14, and footgear 13, or through line 21, exposed movable contact 16a, floor surface 14, and footgear 13. In either case, the situation is electrically the same as when weapon 12 is at rest, and scoring assembly 22 is at rest.

The arrangement and operation of the components of the scoring assembly 22 will best be understood by describing first the actuation of the foul light L2 when the fencer 10 presses the tip end 16a of his weapon 12 against a nonconductive surface. This action disconnects the movable contact 16 from fixed contact 19 in the weapon SW1 which is thus opened to disconnect conductor 21 from the footgear 13, and hence from the negative side of battery 23. As will be seen in the circuit diagram of scoring assembly 22 in the drawing, this disconnects the gate electrode of SCR 1 from the negative side of battery 23 and connects it, through R2, to the positive side so that the positive power from battery 23 fires SCR 1 (i.e. switches it to its conductive state). When pressure on the tip end 16a of the weapon 12 is relieved so that movable contact 16 moves back into engagement with fixed contact 19 under the pressure of spring 17, the gate electrode of SCR 1 is reconnected to the negative side of battery 23 again, which causes the SCR 1 to shut off. SCR 1 is the only SCR in the assembly which is shut off in this manner; the others are shut off by operation of the reset switch SW3, which is subsequently described.

When SCR 1 is fired, as above, it closes a circuit from the positive side of battery 23 through a resistor R3, SCR 1, and a resistor R4 to the negative side of battery 23 and applies positive power to the gate electrode of an SCR 2, which is thus fired. SCR 2 then remains con-

ductive after SCR 1 shuts down and conducts power from battery 123 down into a voltage divider network formed by resistors R5 and R6 which are spaced apart in series with one side of a capacitor C1 connected between. The gate electrode of an SCR 3, which is in a circuit of actuating the foul light L2, is also connected between the resistors R5 and R6. As power passes down through SCR 2 and through R5 it builds up on capacitor C1 until, after a pause of a millisecond or less, the voltage at resistor R6 is positive enough to fire SCR 3 which actuates foul light L2 by closing a circuit from the positive side of battery 23, through SCR 2, which is conducting, through the foul light L2 and SCR 3 to the negative side of battery 23.

The firing of SCR 2 also directs power through a resistor R7 to operate a sound producing device SD1, which may be a conventional bell, buzzer or a known type of electronic solid state audible signal producing device, thus, the sound producing device SD1 is actuated at the same time as the foul light L2 so as to provide both a visible and an audible signal in accordance with usual fencing rules applicable to the use of electrical scoring apparatus. The sound producing device SD1 is also actuated at the same time as the fair hit light L1, as is subsequently described.

When SCR 2 is fired it also operates to fire an SCR 4. For this purpose power from the output side of SCR 2 is directed through a resistor R8 to a capacitor C2 between which is connected the emitter of a unijunction transistor UJT1. The values of R8 and C2 are selected so that, after a delay of about one second, sufficient positive voltage is built up in capacitor C2 to fire UJT1, which thus fires the SCR 4 whose gate electrode is connected to the primary base side of UJT1. As shown, the base leads of UJT1 are connected between resistors R9 and R10 which are in series between the output side of SCR 2 and the negative side of battery 23.

As shown, the anode side of SCR 4 is connected into the connection between fencer 10's exposed conductive surface 11 and resistor R1 so that the anode side of SCR 4 and surface 11 are at the same positive potential when SCR 4 is not conducting. When SCR 4 fires and becomes conductive, its anode voltage drops to a value approximating its forward voltage drop and effectively drops the potential on surface 11 to ground level by connecting the surface 11 to the negative or ground side of battery 23. If the opposing fencer 10' touches his weapon to fencer 10's target surface 11 while the latter is thus grounded, the touching will be ineffective to actuate a fair hit signal in the manner described below. In this way, firing of SCR 4 is effective to stop further scoring until the apparatus is reset, by turning off the SCR 4 in the manner described below. This is in compliance with usual fencing match regulations which provide for stopping the action after a foul or a fair hit has been made in order to be sure foul or fair hits are noted.

As described above, the firing of SCR 2 actuates the sound producing device SD1. The firing of SCR 4 about one second later (the one second delay being provided by the operation of capacitor C2 and resistor R8, as above) then shunts SD1 to ground potential through diode D1 and SCR 4 so as to shut SD1 off.

The firing of SCR 4 also grounds the gate electrode of an SCR 5 through a diode D2 and SCR 4, and thus prevents the firing of SCR 5 while SCR 4 is conductive. The SCR 5, as described below, operates the fair hit light L1.

The fair hit light L1 (or the comparable fair hit light in the scoring assembly of fencer 10') is adapted to be actuable only when both fencers are treading on the conductive floor surface 14 which then forms a part of the circuit for actuating L1.

When both fencers are on the conductive floor surface 14 and fencer 10 presses the tip end 16a of his weapon against the exposed conductive target surface 11' of fencer

of SCR 5 from fencer 10's battery 23 when switch SW1 is disengaged from fixed contact 19 and connects the battery 23' of the scoring assembly of fencer 10' to conductor 21, through resistor R1', conductive surface 11' and movable contact 16. From conductor 21 the positive voltage thus supplied from battery 23' is directed through connector 24 and a resistor R11 to the gate electrode of SCR 5 to fire SCR 5 which operates fair hit light L1 by completing a circuit from battery 23 through L1, SCR 5 and reset switch SW3 to the ground side of battery 23. Resistors R11 and R2 are chosen to allow firing of SCR 5 in the manner described but not to allow firing of SCR 5 from fencer 10's battery 23 when switch SW1 is depressed against a non-conductive surface.

When positive voltage from battery 23' is connected to the conductor 21, as above, it is also carried through connector 24 to the gate electrode of SCR 1 and fires SCR 1, which in turn causes SCR 2 to fire. It will be recalled that SCR 2 is also fired in the previously described sequence of operations which cause the foul hit light L2 and sound producing device SD1 to be operated. In the immediate circumstance SCR 2 causes the sound producing device SD1 to be operated as before (and to be shut off after about one second by the cooperation of C2, UJT1, and SCR 4) so as to be operated when the fair hit light L1 is actuated. The foul light L2 is prevented from being operated. The operation of the foul light 2, as previously described, is actuated by the capacitor C1 building up sufficient voltage from SCR 2 to fire SCR 3, but, when SCR 5 is fired to operate the fair hit light L1, the capacitor C1 is shunted through a diode D3 to the anode side of SCR 5. When SCR 5 is conductive, its anode voltage drops almost to ground level so that the voltage to capacitor C1 is drained off before it accumulates enough to fire SCR 3, which thus remains nonconducting and keeps the circuit through foul light L2 open.

When the SCR's 1 to 5 have been fired in response to fair or foul hits by the weapon 12, SCR's 2 to 5 remain conductive until the reset switch SW3 is operated. SCR 1, however, shuts off automatically when pressure is released from the tip of the weapon 12 which thus reengages movable contact 16 and fixed contact 19 and connects the gate electrode of SCR 1 to ground.

When SCR 5 is conducting and the movable weapon switch 16 has returned to its normal position engaging fixed contact 19, its gate electrode is at substantially ground level voltage. When the reset switch SW3 is in its normal position, indicated in the drawing, its movable contact 28 engages its contact 29 so as to shunt the output from SCR 5 around a resistor R12. Thus, the cathode electrode of SCR 5 is at substantially the same potential as its gate electrode so that SCR 5 remains conductive. When reset switch SW3 is switched to its reset position to move its contact 28 from contact 29 to contact 30, resistor R12 is thereby placed in circuit with the cathode electrode of SCR 5, which thus becomes more positive than the gate electrode, so that SCR 5 shuts off and extinguishes the fair hit light L2.

Switching the reset switch SW3 to its reset position also shuts off SCR's 2, 3 and 4. It shunts resistor R4 to ground so that the voltage at the gate electrode of SCR 2 drops below the voltage at the cathode electrode, causing SCR 2 to shut off. With SCR 2 shut off no current flows to SCR 3 which thus shuts off, extinguishing the foul hit light L2, or to SCR 4 which also shuts off. Also, when SCR 2 shuts off, the gate electrode of SCR 4 is dropped to substantially ground level voltage, and with SW3 in reset position the cathode electrode of SCR 4 is connected in series with resistor R12. This raises the voltage at the cathode of SCR 4 above ground level voltage and provides a second mechanism that guarantees that SCR 4 shuts off.

Some of the resistors in the circuits described above serve functions that have not yet been mentioned. Specifically R3 limits the current in SCR 5 to protect SCR 5

in the event that the tip of the weapon 12 is pressed against a nonconductive surface, and thus opens the switch SW1, when the reset switch SW3 is in reset position. R1 limits the current through SCR 4 which would otherwise short circuit the battery 23. R4 assures the application of sufficient voltage from the output of SCR 1 to the gate electrode of SCR 2 to fire the latter.

From the above description of an illustrative embodiment of the scoring apparatus of this invention it is apparent that the SCR's are electrically operated switching devices for actuating the lights L1 and L2 and sound producing device SD1 and that other switching devices, such as relays, may be used instead. SCR's, however, are particularly suitable since they are relatively small and inexpensive compared with other known means for performing similar functions.

Also, it will be appreciated that some modifications may be made in the structure, arrangement and mode of operation of the elements of the above-described embodiment without departing from the scope of the invention defined by the following claims.

What is claimed is:

1. Apparatus for scoring a fencing match and the like between two fencers comprising:

an electrically conductive floor surface on which the fencers tread for the match;
electrically conductive footwear worn by each fencer for making electrical contact with the floor surface; and

an exposed electrically conductive surface, a weapon and a scoring assembly carried by each fencer;

the scoring assembly of each fencer comprising a source of electric power, a signal producing device and electrically operated actuating means for actuating said device;

the source of electric power in each assembly having a pole of one polarity electrically connected to the exposed conductive surface of the respective fencer and a pole of opposite polarity electrically connected to his footwear;

the weapon of each fencer having a switch with a movable contact mounted to be moved by pressing the tip of the weapon;

the tip of each weapon being electrically conductive and being electrically connected to the switch of the weapon; said actuating means in each assembly being electrically connected to the footwear of the respective fencer and to the switch of his weapon;

the switch of each weapon being operative to connect the actuating means in the scoring assembly of one fencer to the source of electric power in the scoring assembly of the other when the tip of the weapon of the one fencer is pressed against the exposed conductive surface of the other while both are treading on the conductive floor surface, whereby the signal producing device in the scoring assembly of the one fencer is actuated to signal the touching of his weapon against the conductive surface of the other fencer.

2. The apparatus of claim 1 in which the electrically operated actuating means in each scoring assembly comprises switch means operable to be switched to a closed position for actuating the signal producing device by the electric power applied to said switch means when the switch on the weapon of the fencer carrying the respective scoring assembly is operated to complete an electrical connection between said switch means and the exposed conductive surface of the other fencer when both fencers are treading on the conductive floor surface, said switch means being connectible by a second switch means to a source of electric power in the same assembly to be opened thereby for shutting off the signal device.

3. The apparatus of claim 1 in which said signal producing device in each scoring assembly is an electric light operatively connectible to a source of electric power in the same assembly by the operation of said actuating

means, and in which each scoring assembly includes a sound producing device and electrically operated actuating means therefor, the latter actuating means being electrically connected to the footgear of the respective fencer and to the switch of his weapon and being operated by the same operation of said switch which actuates the operation of said light.

4. The apparatus of claim 3 in which the actuating means for the light and for the sound producing device in each scoring assembly comprise switch means connected to be switched respectively to closed position for actuating the light and the sound producing device by electric power applied to said switch means when the switch on the weapon of the fencer who is carrying the respective scoring assembly is operated to complete an electrical connection between said switch means and the exposed conductive surface of the other fencer when both fencers are treading on the conductive floor surface, said switch means for actuating the light being connectible by the other switch means to a source of electric power in the same assembly to be opened thereby for shutting off the light, and said switch means for actuating the sound producing device having timing means connected therein for opening it for shutting off the sound producing device after a predetermined period of actuation.

5. The apparatus of claim 1 in which the scoring assembly of each fencer includes a second signal producing device and second electrically operated actuating means therefor; said second actuating means being electrically connected to the footgear of the respective fencer, to a source of electric power in his scoring assembly and to the switch of his weapon, and being operatively connected to the latter source of electric power for actuating the second signal producing device in his scoring assembly when the tip of his weapon is pressed against a nonconducting surface.

6. The apparatus of claim 5 in which both of said signal producing devices in each scoring assembly are electrically operated lights operatively connectible to a source of electric power in the same assembly by the operation of the respective actuating means therefor, and in which each scoring assembly includes a sound producing device and electrically operated actuating means therefor, the latter actuating means being electrically connected to the footgear of the respective fencer and being connectible to a source of electric power in his scoring assembly, to be operated thereby for actuating the sound producing device, by the operation of the switch of his weapon when the tip of his weapon is pressed.

7. The apparatus of claim 1 in which the switch of the weapon of each fencer comprises a movable electrically conductive contact and a fixed electrical contact electrically connected to his conductive footgear, said movable contact having an exposed end at the tip of the weapon and being movable from a normal position in engagement with said fixed contact to another position out of engagement therewith by pressure applied to said exposed end, and in which the electrically operated actuating means for the signal producing device in the scoring assembly of each fencer is electrically connected between the movable contact of his weapon and his conductive footgear, whereby pressure of said exposed end against the exposed conductive surface of the other fencer disengages said movable contact from the fixed contact and connects the power source of the assembly carried by the other fencer to the actuating means for the signal producing device which is operably associated with said movable contact.

8. The apparatus of claim 7 in which the scoring as-

sembly of each fencer includes: a second signal producing device and second electrically operated means for actuating the second signal producing device; said second electrically operated means being electrically connected to the footgear of the respective fencer, to a source of electric power in his scoring assembly, and to the movable contact of the switch of his weapon, and being operatively connected to the latter source of electric power for actuating said second signal producing device by disengagement of the movable contact from the fixed contact in the switch on his weapon by pressure of the exposed end of said movable contact against a nonconducting surface.

9. The apparatus of claim 8 in which the signal producing devices in each scoring assembly are electric lights operatively connectible to a source of electric power in the same assembly by operation respectively of said actuating means, and in which each scoring assembly includes a sound producing device and electrically operated actuating means therefor, the latter actuating means being electrically connected to the footgear of the respective fencer and being connectible to a source of electric power in his scoring assembly to be operated thereby for actuating the sound producing device, by disengagement of the movable contact from the fixed contact of the switch of his weapon when the tip of his weapon is pressed.

10. The apparatus of claim 9 in which the actuating means for the lights and for the sound producing device in each scoring assembly respectively comprise switch means connected to be switched to closed positions for connecting each of the lights and sound producing device to a source of electric power in the same assembly by disengagement of the movable contact from the fixed contact of the weapon of the respective fencer, the switch means for one of the lights being connected to be actuated by electric power from the source in the other fencer's scoring assembly when the tip of the respective fencer's weapon is pressed against the exposed conductive surface of the other fencer and both fencers are treading on the conductive floor surface, the switch means for the other of the lights being connected to be actuated by electric power from a source in the same assembly when the tip of the respective fencer's weapon is pressed against a nonconductive surface, the switch means for the sound producing device being connected to be actuated by electric power from a source in the same assembly when the tip of the respective weapon is pressed against either a nonconductive surface or against the exposed conductive surface of the other fencer, the switch means for the two lights being adapted to remain in closed position for actuating the lights until electric power is applied respectively to switch them to open position for shutting off the lights, said switch means for the lights being connectible by other switch means to a source of electric power in the same assembly to be opened thereby for shutting off the respective lights, and said switch means for actuating the sound producing device having timing means connected therein for opening it for shutting off the sound producing device after a predetermined period of actuation.

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