

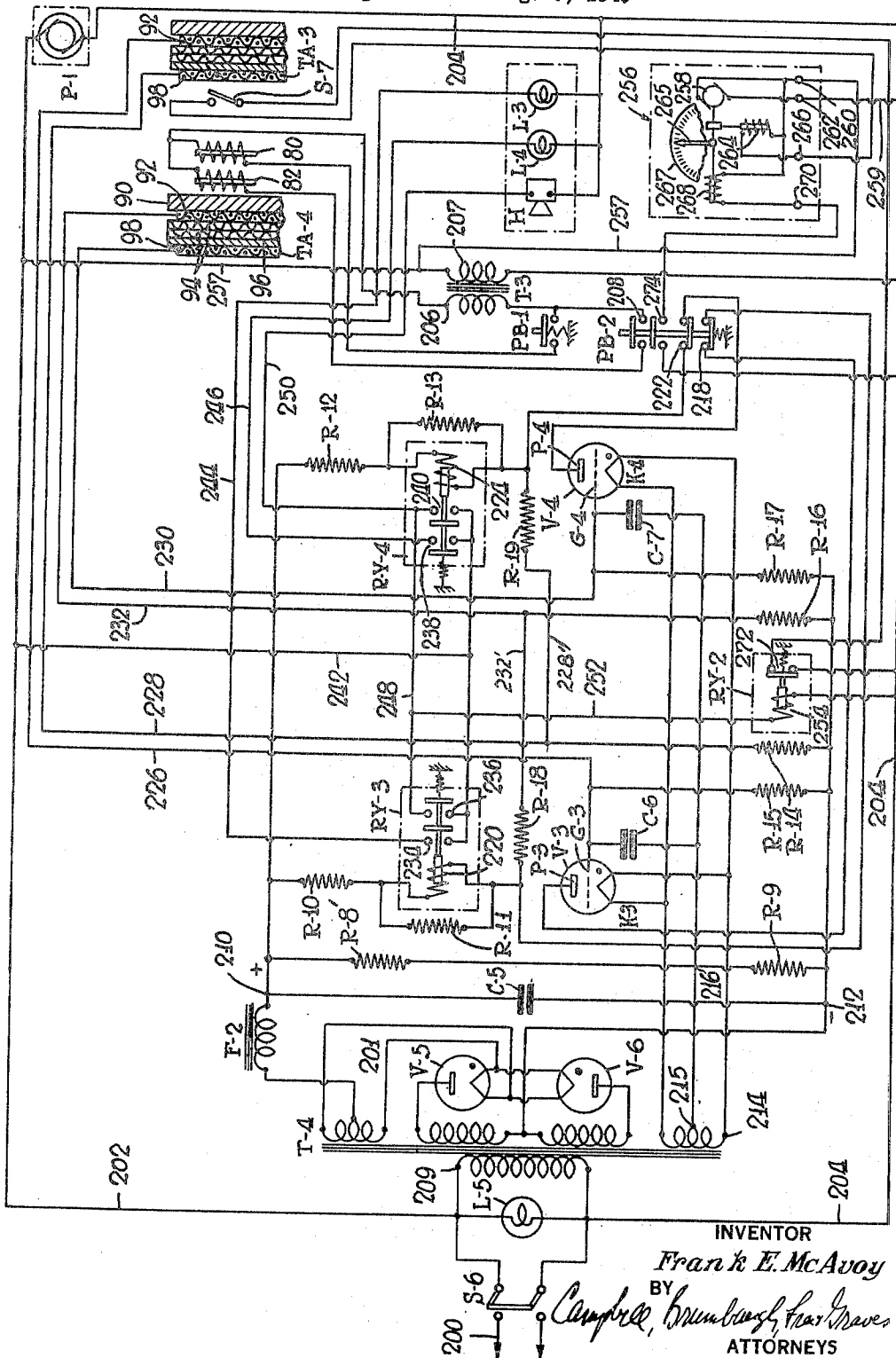
May 31, 1955

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2,709,592

DUELING TARGET

Original Filed Aug. 8, 1945



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1

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DUELING TARGET

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Original application August 8, 1945, Serial No. 609,633,
now Patent No. 2,576,960, dated December 4, 1951.
Divided and this application December 1, 1951, Serial
No. 259,398

14 Claims. (Cl. 273—102.2)

This invention relates to target apparatus and more particularly to multiple target systems for use in shooting competitions and the like.

This application is a division of copending application, Serial No. 609,633, filed August 8, 1945, now U. S. Patent No. 2,576,960.

In multiple target shooting it is often desirable to know which one of the targets has been hit first. In the case of two or more participants shooting at individual targets in a so-called dueling competition, for example, the time interval between the penetration of two targets by the projectiles may be extremely small. If it is to be accurately determined which one of the contestants is to prevail in such dueling competitions, it is necessary that the target system be able to discriminate between extremely short time intervals. Further, in dueling competitions it is of considerable value to the contestants to ascertain the total time elapsed from the instant the targets are presented to the contestants until the first hit is scored, regardless of which target may have been hit.

Target systems of this type are most useful when they permit a series of dueling competitions to be run off in rapid succession so that maximum use may be made of the equipment in any given shooting period. To this end it is desirable that the target system be able to present the targets to the contestants, indicate the first hit, record the total elapsed time, conceal the targets from view or otherwise signal the end of the shooting, and prepare the system for the next cycle in a series of steps which may be effected simply and quickly so as to require minimum effort and talent on the part of the operator.

Accordingly, it is one object of this invention to provide a multiple target system for dueling competitions and the like which will indicate which one of a plurality of closely spaced projectiles first entered its designated target.

It is another object of this invention to provide a multiple target system which will afford an indication of the total time elapsed between an established starting time and the time at which a hit is recorded, regardless of which target might be involved.

It is a further object of the invention to provide improved target apparatus which facilitates the training of participants in the rapid preparation and firing of weapons.

It is a further object of this invention to provide a multiple target apparatus which may be utilized to conduct a maximum number of dueling contests in any given shooting session.

It is another object of the invention to provide a multiple target system which will automatically reset itself to record and time the next hit after the completion of each cycle of operation.

These and other objects, features and advantages of the invention are attained by means of the multiple target system disclosed in the following specification, which is taken in conjunction with the drawing showing in sche-

2

matic form dueling target apparatus including control means, timing means, and indicating means.

Referring to the drawing, the illustrated form of the invention includes two targets, fragmentary portions of which are shown in transverse section and which are respectively identified by the reference characters TA-3 and TA-4. These targets are preferably identical in design, and each may comprise, for example, an assemblage of laminated portions, so arranged that when penetrated by a projectile, an electrical signal will be provided. To this end, the targets may each comprise a backing layer 90, an inner electrode layer 92, an insulating spacer portion which may include layers 94 and 96, and an outer electrode layer 98. Target structure of this type is described in detail and claimed in the said copending application, Serial No. 609,633, now U. S. Patent No. 2,576,960. The targets TA-3 and TA-4 are preferably positioned at the end of the shooting range or ranges and may be mounted on target-carrying means to be presented to the contestants as, for example, by movement from one position to another or simply by sounding a starting signal. The target-carrying means may include a target-erecting solenoid 80 and a target-lowering solenoid 82 which are energized by means of a control system hereinafter described. Preferably, the solenoids 80 and 82 are used to operate control valves in a vacuum system P-1 serving as a source of energy for displacing the targets.

The power to operate the system may be supplied from A. C. supply mains 200 through a manually operated, master control switch S-6. The solenoids 80 and 82 are energized through a transformer T-3, the primary winding 207 of which is connected through lines 202 and 204 and the switch S-6 to the supply mains 200. One side of the secondary winding 206 of transformer T-3 is connected to one side of both of the solenoids 80 and 82. The other side of the target-erecting solenoid 80 is connected through the contacts of a normally open "start" push button switch PB-1 to the other side of the secondary winding 206. Similarly, the other side of the target-lowering solenoid 82 is connected through one set of normally opened contacts 208 of a "reset" push button switch PB-2 to the other side of this secondary winding 206. The vacuum system P-1, which supplies the vacuum to raise and lower the targets, is also connected across the supply mains 200 through the conductors 202 and 204 and the switch S-6. With this arrangement, the targets TA-3 and TA-4 may be presented to view by pressing the push button switch PB-1 and may be withdrawn by pressing push button switch PB-2. It will be understood that the targets may be fixed, and this portion of the system omitted.

The electrode layers 92 and 98 of targets TA-3 and TA-4 are connected to an electrical system comprising two target circuits including electron tubes V-3 and V-4, corresponding respectively to the targets TA-3 and TA-4. In the illustrated form of the invention the tubes V-3 and V-4 are of the grid-controlled, gas-filled type. As described below, these circuits are so arranged that one or the other of two indicator lamps L-3 and L-4 is lighted, dependent upon which target is engaged first by a bullet. Further, the target circuit so actuated blocks the circuit not so operated to prevent the unlighted indicator lamp from being lighted subsequently by a bullet arriving at its target after the first target has been hit.

This double control circuit containing tubes V-3 and V-4 is supplied with direct current power from a pair of terminals 210 and 212 of a suitable direct current power supply source, generally indicated at 201. The D. C. source may include a pair of rectifier tubes V-5 and V-6 connected to a power supply transformer T-4

in a usual full-wave rectifier circuit. The power supply unit is provided with the customary filter network including a choke F-2 and a condenser C-5. The primary winding 209 of the transformer T-4 is connected across the power supply mains 200 through the switch S-6. An indicator lamp L-5 is connected across the primary 209 to indicate when the apparatus has been energized.

Referring now to the target circuits, the cathodes K-3 and K-4 of the tubes V-3 and V-4 are connected in parallel across a heater winding 214 on the power transformer T-4 and the center tap 215 of this winding is connected to an intermediate point 216 on a voltage divider formed of two resistors R-8' and R-9 connected between the terminals 210 and 212 of the power supply so that the cathodes K-3 and K-4 are maintained at a potential slightly more positive than the negative terminal 212, as is the case of the intermediate point 216. The plate P-3 of the tube V-3 is connected through a set of normally closed contacts 218 on the push button switch PB-2, the winding 220 of a relay RY-3 and a resistor R-10 to the positive terminal 210 of the power supply so that a high positive potential is normally applied to the plate P-3. A resistor R-11 is connected in parallel with the winding 220 of the relay RY-3 so that the current therethrough may be properly adjusted. Similarly, the plate P-4 of the tube V-4 is connected through a second set of normally closed contacts 222 on the push button switch PB-2, through the winding 224 of a relay RY-4 and through a resistor R-12 to the positive terminal 210 of the D. C. power supply 201. A resistor R-13 also is connected across the winding 224 of the relay RY-4 to set the current therethrough at a proper value. The grid G-3 of the tube V-3 is connected through a conductor 226 to one electrode layer 92 of the target TA-3 and the other electrode layer 98 of this target is connected through a lead 228 and a resistor R-14 to the negative terminal 212 of the D. C. power supply 201. The grid G-3 of the tube V-3 is also connected to the negative side of the power supply 201 by a grid biasing resistor R-15 and to the intermediate point 216 on the voltage divider R-8', R-9 by a grid condenser C-6. Similarly, the grid G-4 of the tube V-4 is connected through a conductor 230 to one electrode layer 98 of the target TA-4 and the other electrode layer 92 of this target is connected through a conductor 232 and a resistor R-16 to the negative terminal 212 of the D. C. power supply 201. Likewise the grid G-4 is connected to this negative terminal 212 through a grid-biasing resistor R-17 and to the intermediate point 216 of the voltage divider R-8', R-9 through a grid condenser C-7. In addition to these connections, the two control circuits are interlocked by a cross-connection from the conductor 232, which is connected to the electrode layer 92 of target TA-4, through a conductor 232' and a resistor R-18 to the plate circuit of the tube V-3; and by a cross-connection from conductor 228, which is connected to the electrode layer 98 of the target TA-3, through a conductor 228' and a resistor R-19 to the plate circuit of the tube V-4.

The relay RY-3 is provided with two sets of normally-open contacts 234 and 236, and the relay RY-4 is similarly provided with two sets of normally-open contacts 238 and 240. One side of all of these sets of contacts is connected through a conductor 242 to one side of the A. C. supply mains 200 through the conductor 202 and the switch S-6. The other side of the contacts 234 is connected through a conductor 244 to one side of the indicator lamp L-3, the other side of which is connected to the other side of the A. C. supply mains 200 through the conductor 204. Similarly, the other side of the contacts 238 of the relay RY-4 is connected through a conductor 246 to one side of the indicator lamp L-4, the other side of which is connected to the other side of the A. C. supply mains 200 through the conductor

204. The other sides of the contacts 236 of the relay RY-3 and 240 of the relay RY-4 are connected together by conductor 248 and both are connected by conductor 250, through a horn H, or other audible signalling device, to the other side of the A. C. supply mains 200. In addition, the conductor 248, connecting the two sets of contacts 236 and 240, is connected through a conductor 252 and the winding 254 of a relay RY-2 to the conductor 204.

With the control circuit thus far described, when, for example, a bullet passes through the target TA-3, it momentarily forms an electrical connection between the electrode layers 92 and 98 thereof as described above. This effectively short-circuits the conductors 226 and 228 and connects a source of positive potential for the plate circuit of the tube V-4 to the grid G-3 of the tube V-3 through the resistor R-19, the complete circuit from the source to the grid G-3 comprising the positive terminal 210 of the power supply, the resistors R-12 and R-13, the resistor R-19, the conductors 228' and 228, the momentarily shorted electrode layers 98 and 92 of the target TA-3, the conductor 226, and the grid electrode G-3 of the tube V-3. This applies a high positive potential to this grid G-3 and causes the tube V-3 to conduct. The anode-cathode current of the tube V-3 passes through the winding 220 of the relay RY-3 to energize it and close the contacts 234 and 236. This lights the indicator lamp L-3 to indicate that the target TA-3 has been struck by a bullet and also causes the horn H to sound, indicating that one or the other of the two targets has been hit as a signal to the participants in the dueling match to cease firing. At the same time, the anode-cathode current of the tube V-3 passes through the resistor R-9, which is common to the cathodes of both tubes V-3 and V-4 through a circuit including the negative terminal 212, resistor R-9, junction 216, center tap 215 of the secondary winding 214, and the parallel connected cathodes K-3 and K-4 of the tubes V-3 and V-4, respectively. This greatly increases the drop thereacross and by this action causes the cathode K-4, connected to the positive end of R-9, to assume a raised potential and causes the grid G-4 of the tube V-4, connected to the negative end of the resistor R-9, through grid resistor R-17, to be made so negative relatively to the cathode that a subsequent hit on the target TA-4, causing a momentarily positive pulse to be impressed on the grid G-4 of the tube V-4, would not be sufficient to cause the tube V-4 to conduct. Also, while the tube V-3 conducts, the potential across the electrodes of the target TA-4 will be decreased. This decrease in potential across the electrodes of the target TA-4, which first results in a negative pulse to the grid G-4 of the tube V-4 due to the capacity effect of the target electrodes, is brought about by reduction, due to anode-cathode current of the tube V-3, in the positive potential between the plate electrode P-3 and the resistor R-11 and relay coil 220. Since this potential is that which is impressed on the target electrode 92 of the target TA-4, it follows that the positive voltage which would be impressed on the grid electrode G-4 of the tube V-4 in the event of shorting by a projectile of the electrodes of the target TA-4 is likewise reduced. Accordingly a subsequent hit on the target TA-4, particularly one occurring at a very close interval, would be less likely to trigger the tube V-4 even in the absence of the change in the grid-cathode voltage relationship controlled by the common cathode resistor R-9. Thus a hit on one of the targets operates the indicator lamp associated therewith and at the same time blocks the control circuit of the other indicator lamp so that it is impossible for it to operate even though its target should be hit subsequently.

In addition to this arrangement for selectively operating the lamps L-3 and L-4, a suitable timer mechanism, generally indicated at 256, is provided for determining the

time between the raising of the targets and the initial hit thereon.

This timing mechanism includes a synchronous A. C. timing motor 258 connected between two terminals 262 and 260 of the timing mechanism 256. These two terminals 260 and 262 are connected by conductors 257 and 259, respectively, to the conductors 202 and 204 which are connected across the A. C. supply mains 200 through the switch S-6. Thus, the driving motor 258 runs continuously whenever the master switch S-6 is closed. The timing mechanism 256 also includes a clutch mechanism 264 operated by an electromagnet connected between terminals 260 and 266 so that the timing motor 258 may be connected to a time indicating hand 265 to move it around a time scale 267 during the entire period that the electromagnetic clutch 264 is energized. In addition, the timer 256 also includes a reset electromagnet 268 connected between terminals 260 and 270 which, when energized, operates to return the time indicating hand 265 to zero position.

A switch S-7 is mounted on the target-erecting structure so as to be closed as the targets become visible to the marksmen. When the switch S-7 is closed as the targets are raised by the energized target-erecting solenoid 80 to firing position, it connects the terminal 266 on the timer 256 through a set of normally-closed contacts 272 in the relay RY-2 to one side of the supply mains 200 through the conductor 204. The terminal 260 is connected to the other side of the supply mains 200 through the series conductors 257 and 202, thus energizing the electromagnetic clutch 264 to start the timing mechanism 256 in operation and cause the timing hand 265 to move over the scale 267. This operation of the timer 256 continues until one or the other of the targets is hit. For example, if the target TA-3 is hit, as above described, the contact 236 of the relay RY-3 is closed, thus connecting the energizing winding 254 of the relay RY-2 between the power supply conductors 202 and 204 by means of the series conductors 242, 248, and 252. The energization of the relay RY-2 opens its normally-closed contacts 272 to break the circuit through the electromagnetic clutch mechanism 264, thus declutching the time indicating arrow 265 from the synchronous timing motor 258 and thereby stopping the hand. This indicates the time that has elapsed between the time at which the targets became visible and the instant when one or the other of the targets, e. g. the target TA-3, was struck by a bullet. The reset magnet 268 in the timer 256 is connected through the terminal 270 and a set of normally-open contacts 274 in the push button switch PB-2 to the power supply conductor 204. Thus when the cycle of operation is completed and the reset push button switch PB-2 is pushed to reset the entire control mechanism, the reset magnet 268 is energized through these contacts 274 to return the hand 265 to zero.

The arrangement just described permits two contestants to participate in a simulated duel. It determines which of the two contestants first hits his target after the starting signal is given and how much time elapses before this first hit is scored.

Summarizing, this apparatus is placed in condition for operation by closing the master switch S-6 to connect it to the power supply mains 200 and energize the D. C. power supply unit 201 to supply operating potentials to the electronic control circuits of the tubes V-3 and V-4. Closing the switch S-6 also energizes the vacuum pump P-1 for the target erecting and lowering mechanism and the synchronous timing motor 258 of the timer mechanism 256. The two contestants take their positions in the adjacent shooting ranges in some predetermined manner as, for example, with pistols in holsters. At some prearranged signal, as, for example, when the referee says "Ready," he presses the push button switch PB-1 which energizes the solenoid valve 80 to cause the targets TA-3 and TA-4 to move to a visible position. As

soon as the contestants see the targets, they draw their weapons and fire. As the targets move to the point at which they become visible to the contestants, the switch S-7 is automatically operated to energize the electromagnetic clutch 264 to start indicator pointer 265 moving over the time scale 267 to time the contest. As soon as one or the other of the contestants hits his target, the timing mechanism 256 is stopped by the action of the relay RY-2, the indicator lamp L-3 or L-4 corresponding to the hit target lights, the horn H sounds to indicate "Cease firing," and the control circuit of the other indicator lamp is blocked so as to be no longer responsive to further hits on the targets. For example, assuming a hit on the target TA-4, a momentary short circuit is established between its electrode layers 92 and 98, and this connects a high-positive potential to the grid G-4 of the tube V-4 thus causing it to be rendered conductive, and current flows through the winding 224 of the relay RY-4 to attract its armature and close the circuits through the contacts 238 and 240 as above described. The closure of these contacts completes the circuit through the indicating lamp L-4 and the horn H the lamp L-4 indicating that the target TA-4 was the one that was hit and the horn H telling both contestants that one target has been hit. In addition, the closure of circuit through the contacts 240 energizes the winding 254 of the relay RY-2 to open the circuit through the normally-closed contacts 272 and thus open the circuit to electromagnetic clutch 264 (which was previously closed by closure of switch S-7 due to the erecting of the target). This arrests the motion of the timing hand 265 so that its position on the scale 267 indicates the elapsed time of the contest. Meantime the tube V-3 will have become inoperative to respond to a signal from the target TA-3, all as described above. After the elapsed time and the identity of the target first hit are noted by the contestants and recorded by the referee, he pushes the reset push button switch PB-2. This closes the circuit through the contacts 208 to energize the solenoid valve 82 to lower the two targets to a position in which they are no longer visible to the contestants. At the same time this operation closes the circuit of the contacts 274 of the push button switch PB-2 to energize the reset magnet 268 in the timing mechanism to return the timer pointer 265 to zero on the timing scale 267. Operation of the push button switch PB-2 also opens the circuits through the contacts 218 and 222, thus opening the anode-cathode circuits of the tubes V-3 and V-4 to render inoperative whichever one of them was in operation, i. e. the tube V-4, and thus reset the circuits for another cycle of operations. Opening the plate circuit of the operated tube, of course, deenergizes the operating winding of the relay in the plate circuit of that tube, i. e. the relay RY-4, so as to open the contacts thereof, thus turning off the horn H and turning out the lighted indicator lamp, i. e. the lamp L-4. It also deenergizes the relay RY-2 so as once more to close its contacts 272 to condition the circuit to the electromagnetic clutch 264 in the timing mechanism 256 so that the next closure of the switch S-7 (now opened by virtue of the movement of the targets toward their invisible positions) by operation of the target-erecting mechanism will start once again the operation of the timer 256 as above described.

It is to be understood, of course, that this dueling target arrangement may also include features such as an arrangement for burning out accidental short circuits in the targets TA-3 and TA-4 and which may be incorporated to be operated at the time that the mechanism is reset by pushing push button switch PB-2, all as disclosed in the said copending application Ser. No. 609,633, now U. S. Patent No. 2,576,960. Similarly, if desired, a counting mechanism may be included to determine the total number of hits on each of the targets.

The particular form of the invention herein described and illustrated in the accompanying drawing is presented

merely as an example of how the invention may be applied. Moreover, it is to be understood that the phraseology and terminology employed herein are for purposes of description and not limitation. Other forms, embodiments and applications of the invention coming within the proper scope of the appended claims will readily suggest themselves to those skilled in the pertinent arts.

I claim:

1. Dueling target apparatus comprising, in combination, a plurality of targets each adapted to afford an electrical signal when engaged by a projectile, a plurality of amplifiers corresponding respectively to said targets, circuit means connecting each target to its corresponding amplifier, means to energize said amplifiers to respond to the electrical signal produced by the engagement of a target by a projectile, voltage controlling means associated with each of the amplifiers capable of rendering the amplifier instantaneously inoperative, electrical circuit means interconnecting the voltage controlling means of said amplifiers whereby operation of one amplifier renders all other amplifiers inoperative to respond to target signals, and a plurality of indicating means connected respectively to said amplifiers to be actuated thereby.

2. A dueling target-shooting apparatus comprising, in combination, two targets each including two electrodes formed of sheets of electrically conductive material separated by a layer of insulating material and adapted to be momentarily short-circuited by the passage of a metallic projectile therethrough, first amplifier means connected to respond to the momentary short-circuiting of the electrodes of one of said targets, second amplifier means connected to respond to the momentary short-circuiting of the electrodes of the other of said targets, and interlocking means operated by operation of either one of said amplifier means for rendering the other inoperative to respond to a hit on its corresponding target.

3. A dueling target-shooting apparatus comprising, in combination, two targets each including two electrodes formed of sheets of electrically conductive material separated by a layer of insulating material and adapted to be momentarily short-circuited by the passage of a metallic projectile therethrough, two indicating means associated respectively with said targets, first amplifier means energized and connected to respond to the momentary short-circuiting of the electrodes of one of said targets for operating the indicating means associated therewith, second amplifier means energized and connected to respond to the momentary short-circuiting of the electrodes of the other of said targets for operating the indicating means associated with it, and electrical interlocking means cross connecting said first and second amplifier means to cause the operation of either in response to short-circuiting of the electrodes of its corresponding target to disable the other.

4. A dueling target-shooting apparatus comprising, in combination, two targets each including two electrodes formed of sheets of electrically conductive material separated by a layer of insulating material and adapted to be momentarily short-circuited by the passage of a metallic projectile therethrough, two visual indicating means associated respectively with said targets, first amplifier means energized and connected to respond to the momentary short-circuiting of the electrodes of one of said targets for operating the visual indicating means associated therewith, second amplifier means energized and connected to respond to the momentary short-circuiting of the electrodes of the other of said targets for operating the visual indicating means associated with it, electrical interlocking means cross connecting said first and second amplifier means to cause the operation of either in response to short-circuiting of the electrodes of its corresponding target to disable the other, and audible signal means operated by the operation of either of said amplifier means.

5. A dueling target-shooting apparatus comprising, in combination, two targets each including two electrodes formed of layers of electrically conductive material separated by a layer of insulating material and adapted to be momentarily short-circuited by the passage of a metallic projectile therethrough, means for moving said targets into shooting position, a timing device, means responsive to the movement of said targets into shooting position for starting said timing device, and means responsive to the momentary short-circuiting of one of said targets for stopping said timing device.

6. A dueling target-shooting apparatus comprising, in combination, two targets each including two electrodes formed of layers of electrically conductive material separated by a layer of insulating material and adapted to be momentarily short-circuited by the passage of a metallic projectile therethrough, means for moving said targets into shooting position, a timing device, means responsive to the movement of said targets into shooting position for starting said timing device, two electrical actuatable indicating means associated respectively with said targets, means responsive to the momentary short-circuiting of electrodes of one or the other of said targets for operating the indicating means associated with said target when the target is in shooting position, and means operative simultaneously with said indicating means for stopping said timing device.

7. A dueling target-shooting apparatus comprising, in combination, two targets each including two electrodes formed of layers of electrically conductive material separated by a layer of insulating material and adapted to be momentarily short-circuited by the passage of a metallic projectile therethrough, first means for moving said targets into shooting position, second means for moving said targets out of shooting position, a timing device, means responsive to the movement of said targets into shooting position for starting said timing device, control means for initiating operation of said apparatus by operating said first means, two electrical actuatable indicating means associated respectively with said targets, means responsive to the momentary short-circuiting of electrodes of one or the other of said targets for operating the indicating means associated with said target when the target is in shooting position, means operative simultaneously with said operated indicating means for stopping said timing device, and means for simultaneously operating said second means to move said targets out of shooting position and to reset said timing device.

8. A dueling target-shooting apparatus comprising, in combination, two targets each including two electrodes formed of layers of electrically conductive material separated by a layer of insulating material and adapted to be momentarily short-circuited by the passage of a metallic projectile therethrough, first means for moving said targets into shooting position, second means for moving said targets out of shooting position, a timing device, means responsive to the movement of said targets into shooting position for starting said timing device, control means for initiating operation of said apparatus by operating said first means, two indicating means associated respectively with said targets, means including electronic devices rendered conductive by the momentary short-circuiting of electrodes of one or the other of said targets for operating the indicating means associated with said target, means operative simultaneously with said operated indicating means for stopping said timing device, and means simultaneously operating said second means for moving said targets out of shooting position, resetting said timing device and momentarily opening the circuits to said electronic devices to render them non-conductive to prepare the apparatus for another cycle of operation.

9. A dueling target-shooting apparatus comprising, in combination, two targets each including two electrodes formed of layers of electrically conductive material separated by a layer of insulating material and adapted to be

momentarily short-circuited by the passage of a metallic projectile therethrough, first and second means responsive respectively to the momentary short-circuiting of the electrodes of said targets, each of said responsive means including an electronic tube having a cathode, an anode and a control electrode, power supply means for supplying operating potential to the electrodes of said tubes, circuit means connecting a control potential from said power supply means to the control electrodes of each of said tubes, each through the electrodes of one of said targets, so that said control potential is applied to the control electrode of one of said tubes when the target connected thereto is short-circuited, interlocking means interconnecting said tubes and operated by operation of one of said tubes when its corresponding target is engaged by a projectile to readjust the circuit of the other of said tubes and counteract the application of a control potential thereto which would result in the event of engagement of the other target by a projectile, whereby one of said responsive means is rendered inoperative by the operation of the other of said responsive means.

10. A dueling target-shooting apparatus comprising, in combination, two targets each including two electrodes formed of layers of electrically conductive material separated by a layer of insulating material and adapted to be momentarily short-circuited by the passage of a metallic projectile therethrough, first and second indicating means associated respectively with said targets, first and second means responsive respectively to the momentary short-circuiting of the electrodes of each of said targets for operating the corresponding indicating means, each of said responsive means including an electronic tube having a cathode, an anode and a control electrode, power supply means for supplying operating potentials to the electrodes of said tubes, first and second relay means disposed respectively in the anode-cathode circuits of said tubes and connected respectively to said first and second indicating means, circuit means connecting a control potential from said power supply means to the control electrodes of each of said tubes, each through the electrodes of one of said targets, so that said control potential is applied to the control electrode of each one of said tubes when the target connected thereto is short-circuited to cause its anode-cathode current to operate its relay means and thus the indicating means connected thereto, and interlocking means interconnecting said tubes and operated by operation of one of said tubes to readjust the circuit conditions of the other of said tubes and counteract the effect of the possible subsequent application of a control potential thereto through the other target, whereby one of said responsive means is rendered inoperative by the operation of the other of said responsive means.

11. A dueling target-shooting apparatus comprising, in combination, two targets each including two electrodes formed of layers of electrically conductive material separated by a layer of insulating material and adapted to be momentarily short-circuited by the passage of a metallic projectile therethrough, first and second indicating means associated respectively with said targets, first and second means responsive respectively to the momentary short-circuiting of the electrodes of each of said targets for operating the corresponding indicating means, each of said responsive means including an electronic tube having a cathode, an anode and a control electrode, power supply means for supplying normal operating potentials to the electrodes of said tubes, first and second relay means disposed respectively in the anode-cathode circuits of said tubes and connected respectively to said first and second indicating means, circuit means connecting a positive potential from said power supply means to one electrode of each of said targets and connecting the other electrode of each of said targets to the control electrode of one of said tubes, respectively, so that said positive potential is applied to the control electrode of the tube connected to the target which is short-circuited to operate said tube

and cause its anode-cathode current to operate its relay means and thus the indicating means connected thereto, and interlocking means interconnecting said tubes and operated by operation of one of said tubes to readjust the circuit of the other of said tubes and counteract the possible subsequent application of a control potential thereto through the other target, whereby one of said responsive means is rendered inoperative by the operation of the other of said responsive means.

12. A dueling target-shooting apparatus comprising, in combination, two targets each including two electrodes formed of layers of electrically conductive material separated by a layer of insulating material and adapted to be momentarily short-circuited by the passage of a metallic projectile therethrough, first and second indicating means associated respectively with said targets, first and second means responsive respectively to the momentary short-circuiting of the electrodes of each of said targets for operating the corresponding indicating means, each of said responsive means including an electronic tube having a cathode, an anode and a control electrode, power supply means for supplying normal operating potentials to the electrodes of said tubes, first and second relay means disposed respectively in the anode-cathode circuits of said tubes and connected respectively to said first and second indicating means, circuit means connecting a positive potential from said power supply means to one electrode of each of said targets and connecting the other electrode of each of said targets each to the control electrode of one of said tubes, respectively, so that said positive potential is applied to the control electrode of the tube connected to the target which is short-circuited to operate said tube and cause its anode-cathode current to operate its relay means and thus the indicating means connected thereto, interlocking means interconnecting said tubes and operated by operation of one of said tubes to readjust the circuit of the other of said tubes to counteract the possible subsequent application of a control potential thereto through the other target whereby one of said responsive means is rendered inoperative by the operation of the other of said responsive means, and means for opening the anode-cathode circuits of said tubes to cut off the operated tube and prepare the apparatus for another cycle of operation.

13. A dueling target-shooting apparatus comprising in combination, two targets each including two electrodes formed of layers of electrically conductive material separated by a layer of insulating material and adapted to be momentarily short-circuited by the passage of a metallic projectile therethrough, first and second indicating means associated respectively with said targets, first and second means responsive respectively to the momentary short-circuiting of the electrodes of each of said targets for operating said indicating means, each of the corresponding responsive means including an electronic tube having a cathode, an anode and a control electrode, power supply means for supplying normal operating potentials to the electrodes of said tubes, first and second relay means disposed respectively in the anode-cathode circuits of said tubes and connected respectively to said indicating means, circuit means connecting a positive potential from said power supply means to the anodes of said tubes through said relay means, circuit means connecting the positive potential from the anode of each tube to one electrode of the one of said targets associated with the other tube and connecting the other electrode of each of said targets to the control electrode of its associated tube, whereby said positive potential is applied to the control electrode of the tube connected to the target which is first hit to operate said tube and cause its anode-cathode current to operate its relay means and thus the indicating means connected thereto, and simultaneously the potential applied across the electrodes of the other target is reduced.

14. A dueling target-shooting apparatus as set forth

11

in claim 13 including circuit means connected to the cathodes of each of said tubes, said circuit means including a cathode resistor common to each of said tubes, whereby the cathode-anode current flowing as a result of the operation of one of the tubes raises the potential on the cathode of the other tube to cooperate in rendering the other tube unresponsive to a positive voltage from the other target.

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