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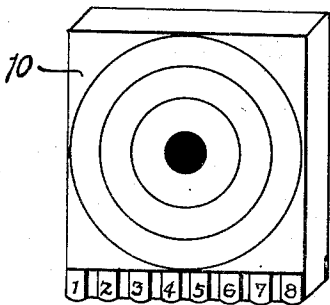
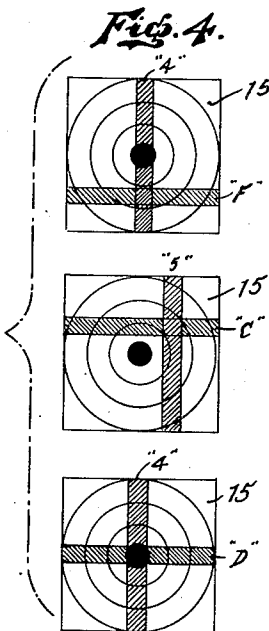
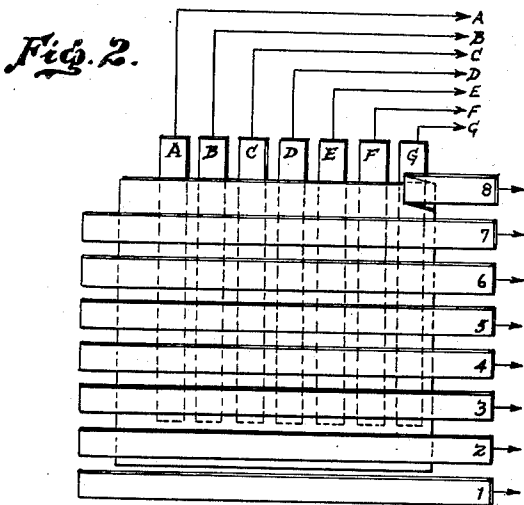
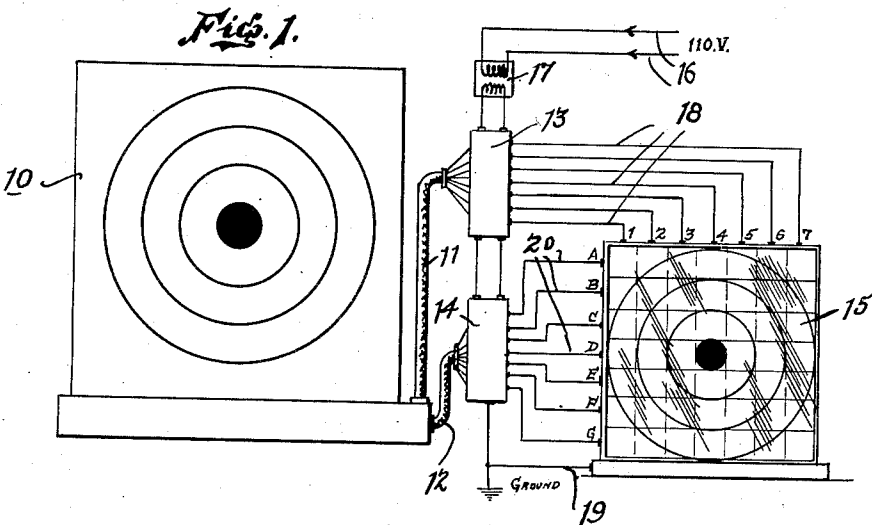
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2,767,987

ELECTRO-RESPONSIVE TARGET

Filed April 9, 1954

2 Sheets-Sheet 1



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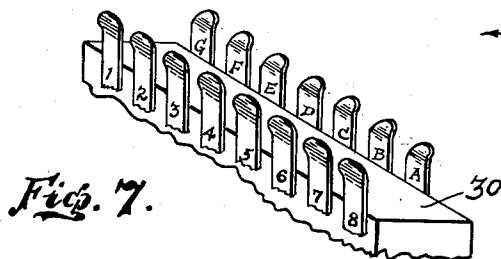
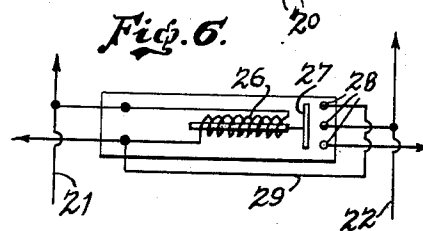
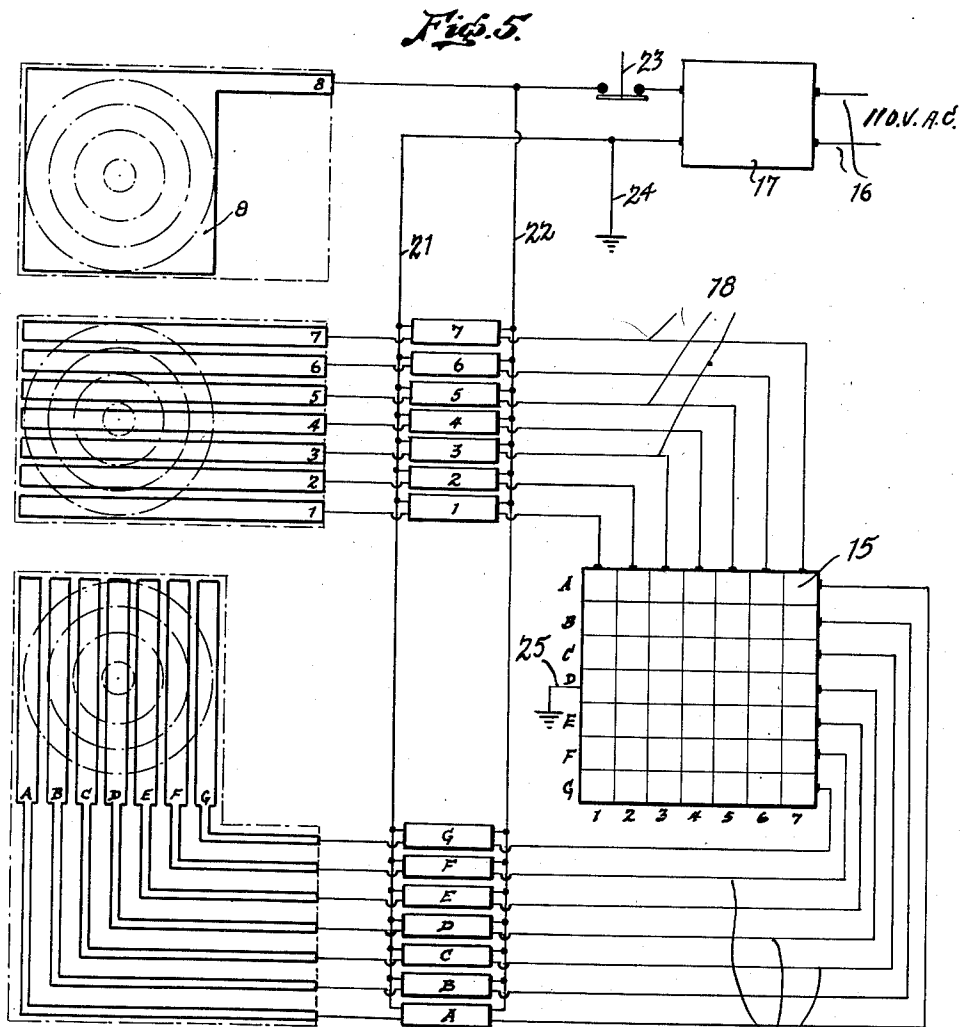
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ELECTRO-RESPONSIVE TARGET

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2 Sheets-Sheet 2



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ELECTRO-RESPONSIVE TARGET

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Application April 9, 1954, Serial No. 422,128

3 Claims. (Cl. 273—102.2)

My present invention relates to targets and more particularly to an electrically controlled target and system by which a projectile perforation of a target may be indicated at a point remote from the target.

An object of the invention is to provide a target with novel projectile activated circuit controlling means by which the position of the projectile in striking the target may be indicated at a distant point.

Another object of the invention is to provide a target system that is particularly suited for naval gunnery practice employing a towed target in which the hits upon the target may be indicated at a remote point as on the back of the target towing vessel.

A further object of the invention is to provide a target and hit indicating system which is novel, accurate and of inexpensive construction.

Other objects and advantages will be in part evident to those skilled in the art and in part pointed out hereinafter in connection with the accompanying drawings wherein there is shown, by way of illustration and not of limitation, a preferred embodiment of the invention.

In the drawings:

Figure 1 is an assembly showing a target and indicating device with electrical connections schematically associated therewith,

Figure 2 is a detailed view showing circuit controlling elements for the target of Figure 1,

Figure 3 is a perspective view showing in outline a target constructed in accordance with the present invention,

Figure 4 is a diagrammatic illustration of the indicator showing the results of three different shots,

Figure 5 is a circuit diagram showing in more detail the connections between the target and the indicating device,

Figure 6 is a fragmentary view showing the circuits of a relay such as is employed in Figure 5 of the drawing, and

Figure 7 is a fragmentary perspective view showing an arrangement by which the target unit of Figure 3 may be readily associated with and replaced in the indicator circuits.

I am aware that others have proposed the use of two spaced sheet-like conductor members that form the terminals of a circuit for an electrically operated indicating device which is completed by the passing of a projectile therethrough. It is therefore a more particular object of the present invention to provide a target of novel construction by which the results of a hit may be indicated at a remote point in such a manner that substantially the exact location of a hit upon the target will be indicated.

As will be seen from the detailed description to follow, my invention involves the employment of a series of conductor strips of thin metal or foil arranged in spaced parallel relation and in vertical plane upon an insulating support and in association with a common sheet metal or foil-like conductor disposed in a plane spaced from said vertical plane, said foil-like conductor having an

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area equal to the area of the target for indicating a hit along one line with respect to the bull's-eye of the target and a second series of conductor strips of foil-like material arranged in spaced parallel relation and disposed in a vertical plane spaced from said foil-like conductor and extending at a right angle to said first series of parallel conductor strips for indicating a second line of deviation of the hit from the bull's-eye of the target.

As shown in Figure 1 of the drawings, the target designated generally by the numeral 10 may be connected through a single cable or cables 11 and 12 to two banks of relays 13 and 14. The relays of the banks 13 and 14, as will be hereinafter pointed out, are of the lock-in type and when energized they establish a holding circuit which will maintain the energization of an indicating means 15 until reset for a subsequent shot. The relays of the banks 13 and 14 are here indicated as energized from a 110 volt A. C. supply circuit 16, through a transformer 17 which may be combined with a rectifier where direct current is desired for the operation of the indicating instrument 15. In this showing the series of conductors designated 18, control circuits through a common return wire 19 for a series of lamps or other indicating means arranged in vertical lines with respect to each other and the series of conductors 20 likewise, through a common ground return circuit, control the operation of a series of lamps or other indicating means arranged horizontally in alignment across the face of the indicating device 15. As here shown, the indicating device is rectangular in outline and is covered by a sheet of transparent material such as glass upon which the circles of the target 10 are applied. Where lamps are used as the indicating means the individual lamps will be boxed in or enclosed within a shield or housing so that only the rectangular area of the glass face of the device 15 adjacent each lamp will light up. In this manner, when a hit is scored upon a target the particular relays of the relay banks 13 and 14 will become energized and light a series of vertically aligned lamps and a series of horizontally aligned lamps which will indicate by their point of crossing substantially the exact point where a projectile has passed through the target.

In Figure 2 of the drawing, there is shown a schematic illustration of the disposition of the two sets of parallel and spaced ribbon-like conductors with respect to each other and the common conductor plate which, as here illustrated, is disposed therebetween and within the area encompassed by the crossing portions of the ribbon-like conductors. The ribbon-like conductors numbered 1 to 7 in conjunction with the conductor plate 8 operate to control the energization of the several vertical rows of lamps of the indicating device 15 and the ribbon-like conductors designated A to G inclusive will operate in combination with the common conductor plate 8 to complete circuits for horizontal rows of lamps of the indicator 15.

In Figure 3 of the drawings there is shown an assembled unit such as might be employed for supporting the ribbon-like conductors 1 to 7 inclusive and A to G inclusive in properly spaced and cooperating relation with the common conductor plate 8. When assembled in this manner the ribbon-like strips of foil or other conducting material will be secured upon an insulating member such as cardboard or the like and the common conductor plate 8 will be likewise supported in spaced and insulated relation between the two groups of parallel ribbon-like conductors. The actual form of the ribbon-like conductors A to G inclusive is such that they may be folded upon each other and form terminals along the opposite side of the target unit of Figure 3 in the same manner as do the terminal ends of the ribbon-like conductor members 1 to 7 and the common conductor plate 8 which are here shown as disposed along one edge and exposed at

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one side of the target unit 10. As will be hereinafter pointed out this arrangement of the terminal ends of the ribbon-like strips and the common conductor plate will facilitate a placing and replacement of the target unit 10, into the control circuits of the indicating device 15 in a simple and convenient manner.

In Figure 4 of the drawings there is illustrated the locations of three successive shots upon the target 10 when arranged and connected with the indicating device 15 as shown in Figure 1 of the drawings. In the upper target the hit is indicated as occurring on center but below the bull's-eye of the target. In this instance, the bullet which produced this indication has passed through the ribbon-like conductor 2, the common conductor plate 8 and the ribbon-like conductor D. In the next lower showing the indication is that the hit was wide to the right and high with respect to the bull's-eye. In producing this result upon the indicator 15 the bullet would have passed through the ribbon-like conductor 5 and the ribbon-like conductor C. In the lowermost view the projectile will have passed through the ribbon-like conductors 4 and D to establish connections with the common conductor plate 8. In comparing these showings with the arrangement of ribbon-like conductors as illustrated in Figure 2, it should be stated in this latter figure the ribbon-like conductors 1 to 7 and A to G are rotated 90 degrees clockwise from the positions of the circuit forming conductors 18 and 20 as indicated in Figure 1 of the drawings.

By now referring to Figure 5 of the drawings it will be noted that the sheet or plate like conductor 8 of the target assembly is connected to one side of the power circuit and that the banks of relays 13 and 14 operate to complete the circuits of the indicating device whenever a projectile establishes a circuit between any one of the ribbon-like conductors 1 to 7 or A to G and the common conductor plate 8 in its passage through the target. The common conductor plate 8 has an extending ribbon-like portion that is comparable to the extension of the ribbon-like contacts 1 to 7 of the target and the ribbon-like conducting strips A to G are provided with extending L-shaped or right angled terminal ends which when folded over the target forming portions of these ribbon-like strips will provide corresponding terminal contacts that will be disposed in a line and at the opposite side of the target unit as indicated for the contact terminals 1 to 7 and 8. In this way as previously explained, the target unit 10 will have a series of exposed contacts which will establish connections with the control relays and the indicating device 15. In this diagram, the relays 1 to 7 of the relay bank 13 control the circuits of vertically arranged indicating lamps and the relays A to G control the circuits of the lamps arranged horizontally in the indicating device 15. In addition to the series of conductors 18 and 20 which extend from the banks of relays 13 and 14 to the indicating device 15 this diagram shows vertically extending conductors 21 and 22 or busses that connect the banks of relays 13 and 14 with the plus and minus sides of the output of the transformer 17 which in the preferred arrangement will operate through a rectifier (not shown) to provide direct current for operating the relays. Associated with the power circuit there is a normally closed push button switch 23 by means of which the locked-in relays of the relay banks 13 and 14 may be de-energized to reset the indicating device 15 for a subsequent shot. The conductor 21 is here shown as grounded by a conductor 24 which in combination with the grounded conductor 25 completes a circuit for the other side of the lamps of the indicating device 15.

While it is conceivable that many different types of relays may be employed in the relay banks 13 and 14, there is shown in Figure 6 of the drawings a simple circuit connection for such a relay which provides for a locking of the relay whenever it is activated by an im-

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pulse of current as a projectile instantaneously establishes a circuit between any one of the ribbon-like conductors 1 to 7 or A to G and the common conductor plate 8. In this showing each of the relays of the relay banks 13 and 14 have an actuating coil 26 which operates a movable circuit establishing contact 27 that is normally out of contact with three stationary terminals 28, the upper one of which, through a conductor 29, provides a locking circuit for the coil 26 when the relay is operated.

In Figure 7 of the drawings, there is shown a terminal block or support designated by the numeral 30 which carries spaced upstanding contact clips that are positioned in such a manner that when a target unit 10 such as is illustrated in Figure 3 of the drawings is supported there-upon the exposed contacts of the target 10 will register with the similarly identified clips of the terminal block 30 and complete the circuits of the system in properly associated relation with the ribbon-like conductors and the plate like conductor of the target.

While I have, for the sake of clearness and in order to disclose the invention so that the same can be readily understood, described and illustrated a specific device and arrangement, I desire to have it understood that this invention is not limited to the specific means disclosed, but may be embodied in other ways that will suggest themselves to persons skilled in the art. It is believed that this invention is new and all such changes as come within the scope of the appended claims are to be considered as part of this invention.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. A target for an electrical system of the character described, comprising a rectangular structure formed of insulating material having an intermediate centrally disposed sheet-like plate of current conducting material with an exposed terminal end extending from one side thereof, a plurality of current conducting strips extending in spaced parallel relation with each other disposed in a parallel plane spaced outwardly from one side of said sheet-like conductor plate and having terminal ends exposed in a line along one edge of said rectangular structure, a second plurality of conducting strips extending in spaced parallel relation to each other at a right angle to the direction of said first spaced conducting strips and disposed in a parallel plane spaced outwardly from the other side of said sheet-like conductor plate, said first and second plurality of conducting strips being spaced from the respective sides of said conductor plate at a distance comparable to the length of a projectile, whereby electric circuits will be successively established between the terminal forming extension of said conductor plate and the conducting strips at opposite sides thereof as the projectile passes through the target, said second plurality of spaced conducting strips having circuit forming extensions adapted and arranged when folded over said rectangular structure to provide exposed terminal ends for said latter conducting strips along the same edge and at the other side of said rectangular structure.

2. A target for an electrical system of the character described, comprising a rectangular structure formed of insulating material having an intermediate centrally disposed sheet-like conductor plate having an exposed terminal forming extension at one side thereof, a plurality of conducting strips extending in spaced parallel relation with each other and disposed in a parallel plane spaced outwardly at one side of said sheet-like conductor plate having terminal ends exposed in a line along one edge of said rectangular structure, a second plurality of conducting strips extending in spaced parallel relation to each other at a right angle to the direction of said first spaced conducting strips and disposed in a parallel plane spaced outwardly from the other side of said sheet-like conductor plate, said first and second plurality of conducting strips being spaced from the respective sides of said conductor plate at a distance comparable to the

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length of a projectile, whereby electric circuits will be successively established between said conductor plate and the conducting strips at opposite sides thereof as the projectile passes through the target, said second plurality of space conducting strips having L-shaped circuit forming extensions which when folded over said rectangular structure in outwardly spaced relation will provide exposed terminal ends for said latter conducting strips along the other side of said rectangular structure and opposite the exposed terminal ends of said first conducting strips.

3. A target for an electrical system of the character described, comprising a rectangular structure of insulating material having an intermediate centrally disposed sheet-like conductor plate, a plurality of conducting strips extending in spaced parallel relation disposed in a parallel plane spaced outwardly from one side of said sheet-like conductor plate and having terminal forming ends exposed in a line along one edge of said rectangular structure, a second plurality of conducting strips extending in spaced parallel relation to each other at a right angle to the direction of said first spaced conducting strips and disposed in a parallel plane spaced outwardly from the other side of said sheet-like conductor plate, said first and second plurality of conducting strips being spaced from the respective sides of said sheet-like con-

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ductor plate at a distance comparable to the length of a projectile, whereby an electric circuit will be established between said conductor plate and the conducting strips at opposite sides thereof as the projectile passes through the target, said second plurality of space conducting strips having connection forming extensions adapted and arranged to be folded over said rectangular structure and provide exposed terminal ends for said latter conducting strips at the other side of said structure and opposite the terminal ends of said first conducting strips, and a stationary support for said rectangular structure having upstanding contacting terminals connected with an electrically actuated indicating device arranged and adapted to be engaged by the exposed terminal ends of said conducting strips when the rectangular target structure is positioned thereupon.

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