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[54] **FREQUENCY RESPONSIVE LIGHT TARGET**

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Related U.S. Application Data

[63] Continuation of Ser. No. 243,603, April 13, 1972, abandoned.

[52] **U.S. Cl.** **273/101.1**; 250/233

[51] **Int. Cl.** **F41j 5/02**

[58] **Field of Search** 250/233, 217; 273/101.1, 273/101.2, 105.3

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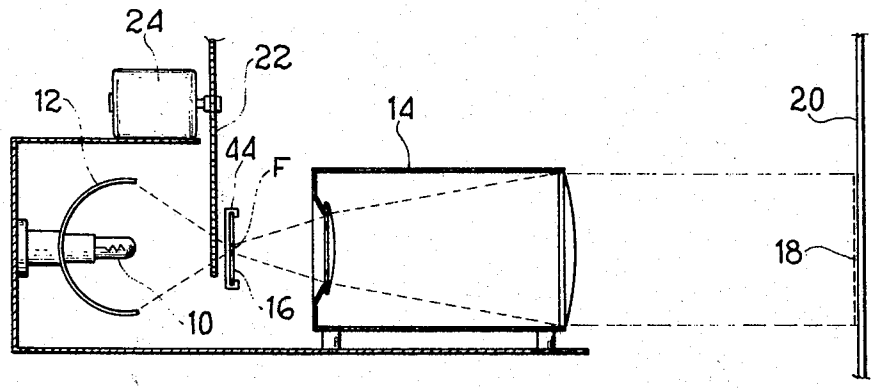
[57] **ABSTRACT**

A simulated target shooting apparatus comprising a source of modulated light having a pre-set frequency. The light takes the form of a target image. A weapon facsimile is provided which cooperates with a receiving device comprising a photocell and a detector adapted to select one one of the different signals sent-out by said photocell when hit by light rays. The signals so generated are forwarded to supply a hit target indicating signal.

1 Claim, 4 Drawing Figures



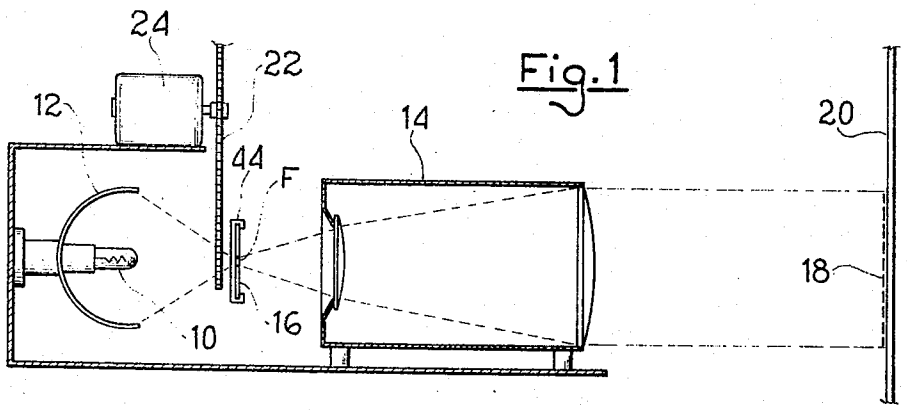


Fig.1

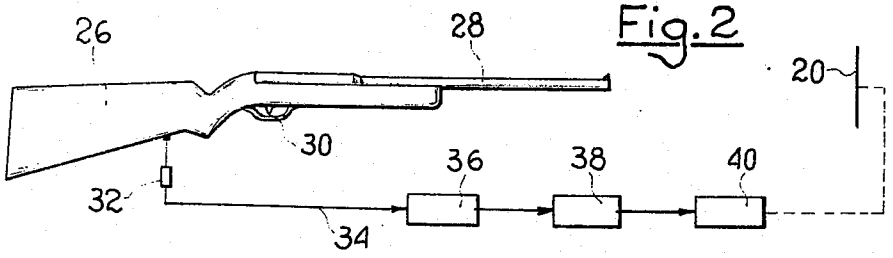


Fig.2

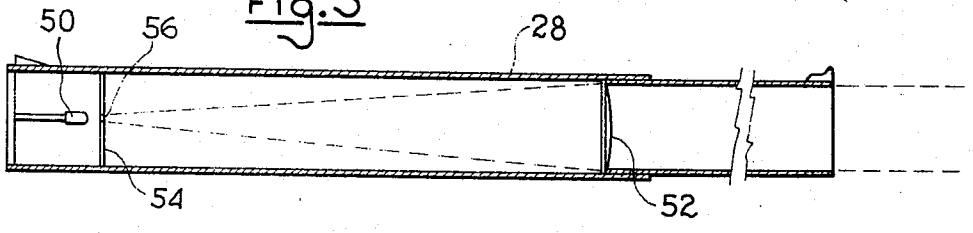


Fig.3

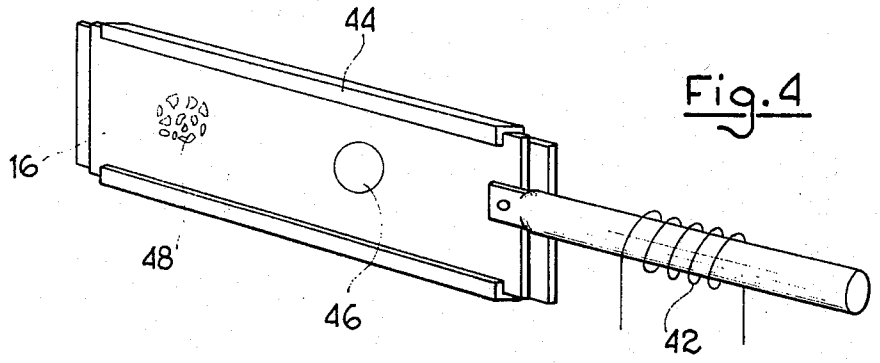


Fig.4

FREQUENCY RESPONSIVE LIGHT TARGET

This is a continuation of application Ser. No. 243,603 filed Apr. 13, 1972 and now abandoned.

BACKGROUND

This invention concerns an equipment for simulating a target shooting and can be utilized both for a game rifle range and, due to high shooting accuracy thereof, for sham target practice, said apparatus comprising a light source and photo-electric means for picking-up the light of said light source and supplying a hit target indicating and/or control signal.

Already known apparatuses of the above defined type usually comprise means for emitting a timed light beam in cooperation with a weapon facsimile, as well as a photocell associated with a target and adapted to be excited by the light beam sent-out by said weapon. Said known apparatuses have inherent drawbacks in that their photocell may become excited by a light source different from said light beam sent-out by the weapon, and accordingly said photocell must be set each time according to environmental light conditions in order to prevent wrong hit target signals. Moreover, the light beam sent-out by the weapon should have a minimum of light power in order to be able to excite the set photocell and therefore said beam cannot be narrowed at will to increase the shooting accuracy.

Therefore, an object of this invention is to provide a simulated target shooting apparatus of the type referred to, wherein said hit target indicating and/or control signal is supplied only when said photo-electric means are hit by the light rays of said light source, independently from the environmental conditions, as well as from the setting of said photo-electric means.

A further object of this invention is to provide an apparatus of the type referred to, wherein an unusually high fire accuracy can be obtained, and wherein the width of a light beam that is able to hit said photo-electric means may be adjusted at will in order to simulate different types of shooting.

SUMMARY

The above and further objects of this invention can be achieved by an apparatus of the type as above stated, wherein said light source is adapted to send-out a light modulated according to a pre-set frequency, and wherein said photo-electric means cooperate with detecting means adapted to select, amongst different signals sent-out by said photo-electric means when hit by different light rays, the signals generated by said modulated light and forward the same in order to supply said hit target indicating and/or control signal.

According to a preferred embodiment of this invention, said modulated light source is in the form of a target image, while said photo-electric means are associated with a weapon facsimile and are adapted to cooperate with optics and/or light ray guide means to narrow at will the max width of a light beam that is able to hit said photo-electric means, and then define the simulated shooting accuracy, shutter or switching means being provided for timing a picking-up period during which said detecting means are adapted to receive signals from said photo-electric means.

DRAWING

FIG. 1 is a diagrammatic view of a device for forming a target image.

FIG. 2 is a diagrammatic view of a receiving device, as associated with a rifle facsimile.

FIG. 3 is a diagrammatic view of photo-electric means and light beam guide and narrowing optics of said receiving device.

FIG. 4 is a perspective view of a component of said target image forming device.

PREFERRED EMBODIMENT

Referring to the drawing, the shown apparatus comprises a device adapted to form a light source having particular features (FIG. 1), as well as a receiving device (FIG. 2) sensitive to light signals from said source, the former device being associated with a target, whilst the latter device is associated with a rifle facsimile or the like.

Referring now to FIG. 1, the target forming device comprises a lamp **10** or other suitable light source and an optical reflector **12** by which the light of said lamp **10** is focused onto the focus F of a projector set **14.** Within the same focal plane F is a plate **16** wherein at least one suitably shaped orifice is formed, through which the light focused by said reflector **12** is allowed to pass in order to be then projected onto a screen **20** in the form of a target image **18.** Said screen **20** may be both of a transparent or a reflective type and said image **18** is formed accordingly on the right or reverse side of the same screen **20.**

The light as sent-out by the lamp **10** is modulated e.g. by means of a slotted disc **22,** which is positioned in such a manner as to interfere with the light beam focused by said reflector **12** and is driven by a motor **24** at a suitable angular speed, e.g. in such a manner as to obtain a frequency of 1,000–2,000 interruptions per second. Such a frequency cannot be perceived by an human eye and a steady image is then seen, while said modulated light cannot be mistaked for other possible pulsating light sources.

Referring now to FIG. 2, a receiving device comprises a rifle facsimile **26** or the like, having a barrel **28** to which is associated a receiving photocell optics, adapted to forward signals to detecting means electrically connected therewith. More detailedly, when a rifle trigger **30** is pulled, a camera-type shutter fitted in front of a photocell is opened, or a switch **32** located downstream the same photocell is closed for a pre-set time. In both cases, signals are sent by same photocell through a lead **34** connected with detecting and selecting means, e.g. in the form of a conventional AC amplifier **36** which is set in such a manner as to amplify and forward only the signals coming from the photocell and modulated according to the frequency of the light sent by said target image **18.** Thus, the apparatus cannot be influenced by the environmental light conditions and the amplified signal can be forwarded to a hit target indicating and metering device **38,** as well as, if required, to a projector controlling apparatus **40,** by which e.g. a solenoid **42** can be energized (see FIG. 4) in order to shift said plate **16** within guide means **44** and project an image of hit target (orifices **48**) in substitution of a plain target image (orifice **46**).

The optical and photo-electric receiving means as shown in FIG. 3 comprise a photocell **50,** positioned in the focus of the lens **52** having an optical axis substantially coincident with the rifle aim line. Between said photocell **50** and lens **52** (that may consist of a lens set) is a diaphragm **54,** having an opening **56** adapted to limit the visual angle from the photocell to said lens,

and thus the width of a light beam by which said photocell can be hit. As it can be readily appreciated, by suitably varying the position of diaphragm **54** and/or the size of opening **56** and/or the focal length of lens **52**, the width of said light beam can be adjusted at will, whereby to simulate different types of shooting, as e.g. a precision shooting with single ball cartridges or a shooting with small shot cartridges.

Both the photocell and the optical set may be fitted on movable supports (not shown) for an adjustment of the aim line. On the other hand, the target forming device, as shown in FIG. **1**, may be movably fitted to form a movable image **18**. Moreover, many changes may be made in the afore described devices, e.g. by providing a light modulation at different frequencies and suitable filtering means in the receiving device in order to have different shooting types easily selectable.

I claim:

1. A simulated target-shooting apparatus having a light source adapted to be projected upon a screen and a means within a simulated gun adapted to receive a light signal projected upon the screen from the light source, comprising

a. a target screen,

b. a target image adapted to be projected by the light source upon said target screen and emitting a modulated signal having a preset frequency upon said target screen,

c. a photo-electric cell contained in a simulated gun and adapted to be directed upon said screen to receive said modulated signal and to be activated thereby,

d. a detector means in circuit with said photo-electric cell and receiving therefrom a signal pulse identical to said preset frequency modulated signal projected from said signal source onto said screen and received by said photo-electric cell,

e. and a hit target indicator in circuit with said detector means and adapted to be energized by a signal pulse from said detector means when the latter receives a signal pulse from said photo-electric cell so as to interrupt said light signal to indicate a target hit upon said target screen,

f. said hit target indicator including a movable plate having target-image-forming orifices therein, with said plate intercepting a modulated light signal emitted from the target image for projecting upon the screen different target images.

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