

- [54] **REMOTE MONITORING AND WEAPON CONTROL SYSTEM**

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- [51] Int. Cl. H04n 7/02, H04n 7/18

- [58] **Field of Search**.....178/DIG. 38, 6:8

- [56]
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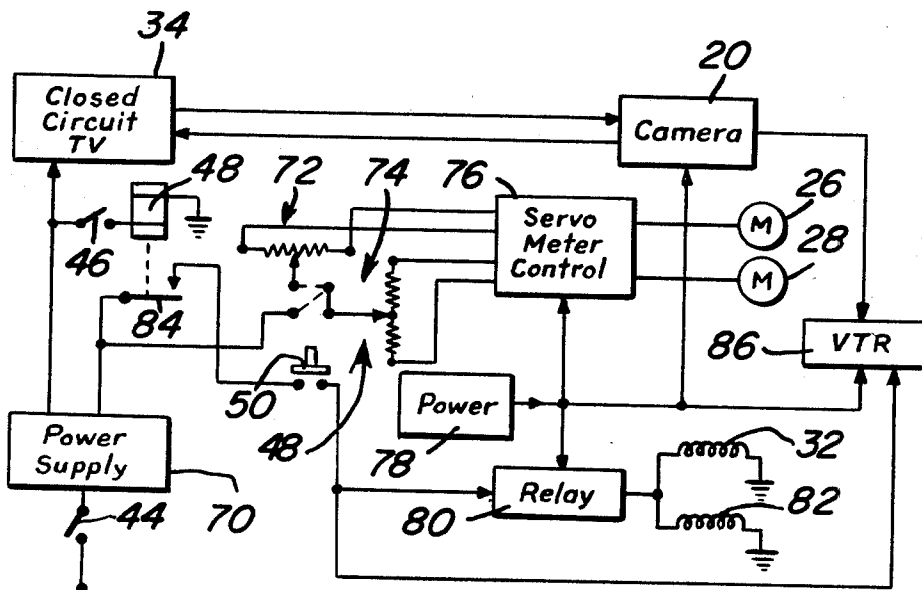
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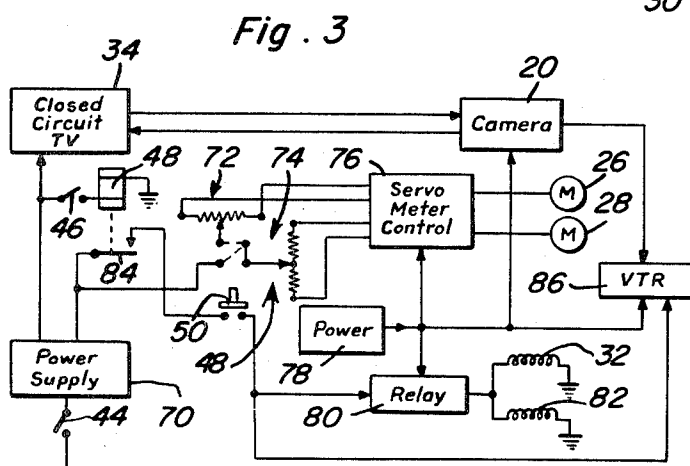
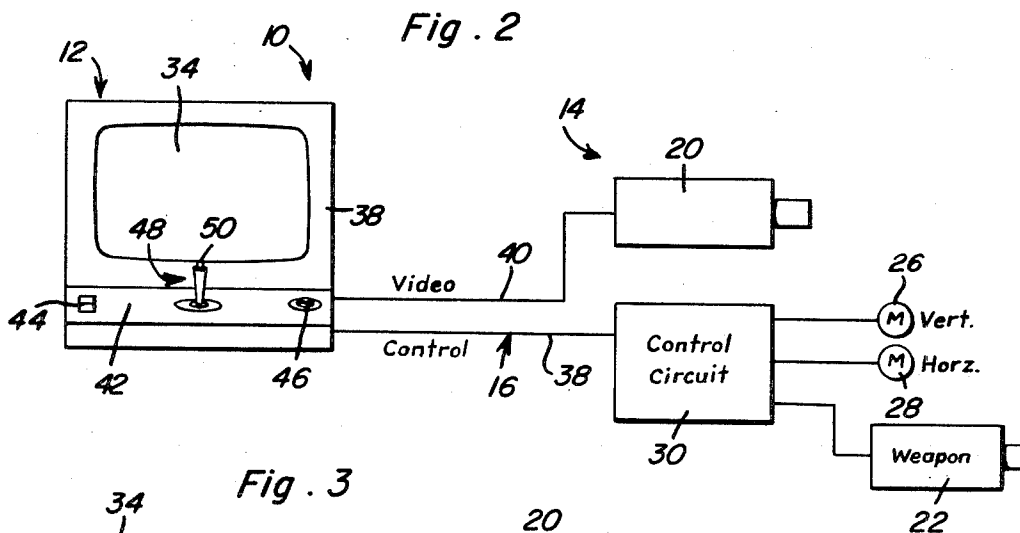
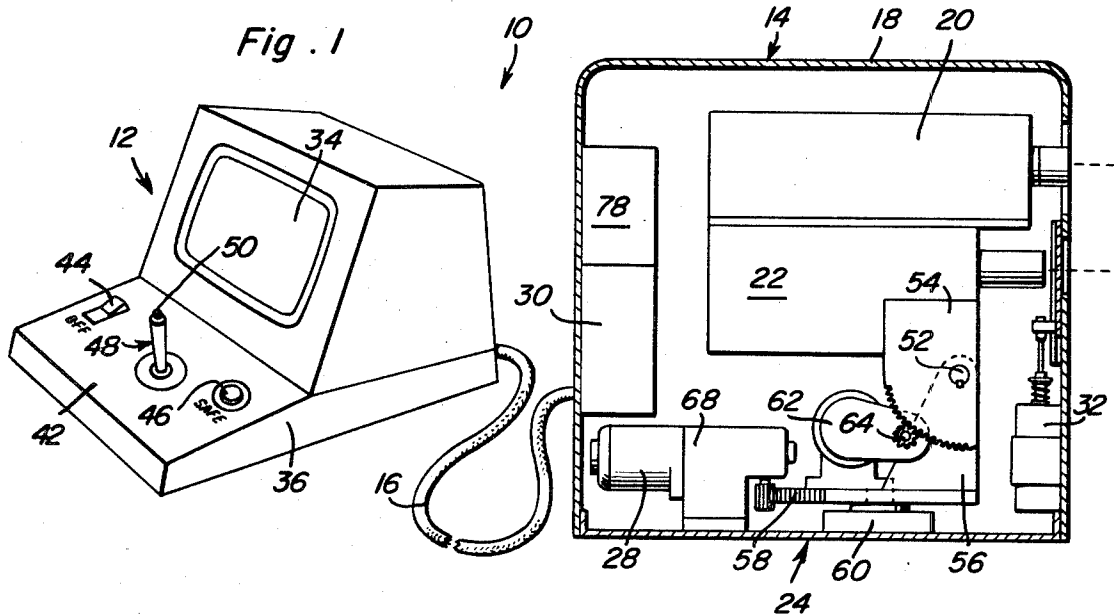
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[57] **ABSTRACT**

A weapon is adjustably positioned and synchronized for movement with a television camera by servo motors controlled from a remote control station. A closed circuit, monitoring receiver at the control station enables an operator to vary the position of the camera and weapon in order to track a target as well as to trigger the weapon.

4 Claims, 3 Drawing Figures





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REMOTE MONITORING AND WEAPON CONTROL SYSTEM

This invention relates generally to remote control apparatus and more particularly to the adjustable positioning and triggering of a device adapted to be optically aligned with a target.

The aiming and triggering of a weapon by remote control has heretofore been proposed. Such prior systems however, have not been particularly successful where the operator is located a substantial distance from the target zone so that the target cannot be viewed because of premature trigger of the weapon and lack of any practical recording of the target. It is therefore an important object of the present invention to enable an operator to control the positioning and triggering of a weapon or the like including firearms, tranquilizer guns, percussion guns, sound guns, light guns, etc. while tracking the target from said remote location without direct viewing thereof. Thus, the system of the present invention will be particularly useful as a security system for banks, industrial plants and for aircraft enabling the pilot and crew to thwart hijackers. Also, the system will be especially useful for military applications in guarding gates, documents and as a defense weapon.

In accordance with the present invention, a method is provided whereby commercially available components are utilized for achieving the aforementioned objectives. Thus, a closed circuit television system is utilized in which a camera is mounted for synchronized movement with an adjustably positioned weapon in order to permit the operator at a remote control station to track a target by viewing the target through a monitoring television receiver. The weapon and television camera are adjustably positioned by servo motors displacing the movable assembly in vertical and horizontal directions. Thus, when the target is optically aligned with the television camera as viewed by the operator on the receiving monitor, the target will also be optically aligned with the weapon which may then be triggered by the operator at a relatively safe remote control station. While the weapon is triggered, the image picked up by the camera is recorded. Also, the weapon can be triggered only while the receiving monitor is operating.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIG. 1 illustrates the apparatus of the present invention with a side wall of one of the components removed.

FIG. 2 is a schematic block diagram illustrating the various components associated with the system of the present invention.

FIG. 3 is a simplified circuit diagram corresponding to the control system associated with the present invention.

Referring now to FIGS. 1 and 2, the apparatus of the present invention generally denoted by reference numeral 10 includes a control console 12 adapted to be located at a control station remote from a guarded station being serviced by the component 14 to which the control console is operatively connected by an elon-

gated conductor carrying cable 16. The component 14 which may be protectively enclosed within a housing 18 for example, includes a closed circuit television camera 20 mounted for adjustable positioning in synchronized relation to a weapon 22. In the illustrated embodiment, the camera and weapon are directly attached to each other for simultaneous movement by a positioning mechanism generally referred to by reference numeral 24 with which a pair of servo motors 26 and 28 are associated. Energization and de-energization of the servo motors 26 and 28 are controlled through a control circuit 30 through which triggering of the weapon 22 may also be effected. An iris operating solenoid 32 may, for example, be associated with the weapon and energized in order to trigger or render the weapon operative. The weapon is however conditioned for operation only after the television camera 22 is in operation so that the target with which the weapon is to be optically aligned, may be tracked by the operator through the control console 12.

The control console 12 includes a television monitoring receiver 34 enclosed within the same housing 36 containing the control circuitry through which control signals are transmitted by the control lines 38 to the control circuit 30. The control cable 16 in addition to enclosing the control lines 38 also encloses the video conductors 40 which interconnect the camera 20 and receiver 34 in a closed circuit system. The console housing 36 is also provided with a control panel 42 mounting an on/off switch 44, a safety switch 46 and a weapon positioning control 48 which mounts a triggering switch 50. Thus, after the on/off switch is displaced to its on position, the operator may adjustably position the camera and weapon by displacement of the control 48 which is suitably mounted for universal movement in two perpendicular directions corresponding to vertical and horizontal displacement of the camera and weapon. Control over the positioning of the camera and weapon in order to track the target may be accomplished by the operator while viewing the target in the monitoring receiver 34 which is rendered operative upon displacement of the switch 44 to the on position. When the operator is prepared to utilize the weapon, the safety switch 46 is first actuated in order to render the trigger switch 50 operative to cause discharge of the weapon in the case of a firearm or emission of radiation in other types of weapons as aforementioned.

The weapon 22 and camera 20 may be movably mounted within the housing 18 for adjustable positioning thereof by means of a pivot shaft 52 to which the sector gear 54 is connected forming part of the adjustable positioning mechanism 24. The pivot shaft 52 is carried by a bracket 56 projecting upwardly from a horizontal gear member 58 which is rotatably mounted by the bearing 60 about a vertical axis. Also mounted on the gear member 58, is the vertical servo motor 26 drivingly connected through a reduction gear device 62 and pinion gear 64 to the sector gear 54 displaceable about a horizontal axis through the pivot shaft 52. The gear member 58, on the other hand, is angularly displaceable about a vertical axis by means of the pinion gear 66 in mesh therewith, the pinion gear being driven by the horizontal servo motor 28 through the reduction gear device 68.

Referring now to FIG. 3, a typical electrical control system is illustrated in which electrical energy from the power supply 70 is delivered upon closing of the on/off switch 44 to the closed circuit television receiver 34 operatively interconnected with the camera 20 as aforementioned. Electrical energy is also supplied to the manual control 48 through which a pair of reversible speed control portions 72 and 74 are operative upon the servo motor control circuit section 76 to control energization and de-energization of the servo motors 26 and 28 in opposite directions for re-positioning of the camera 20 and weapon 22. Power from source 78 at the weapon station, will supply operating voltage to the motor control circuit section and to a relay circuit section 80 which will, upon receipt of a triggering signal, energize the solenoid 32 aforementioned and the trigger mechanism 82 associated with the weapon. The triggering signal is however supplied only upon closing of the safety switch 46 thereby energizing the relay 88 so as to connect the power supply 70 through the normally opened relay switch 84 to the trigger switch 50 from which the triggering signal is obtained. Closing of the triggering switch 50 may be also operative to initiate operation of a video tape recorder 86 in order to record the target zone through the camera 20 when the weapon is triggered.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention.

What is claimed as new is as follows:

1. In combination with an adjustably positioned device adapted to be optically aligned with a target, a remote control system comprising a television camera, a target monitoring receiver, closed circuit means in-

terconnecting the camera and the receiver, means movably mounting the camera and the adjustably positioned device for synchronized movement, motor means operatively connected to the movable mounting means for imparting movement to the camera and the adjustably positioned device, manually operated control means mounted adjacent the receiver and connected to the motor means for tracking the target, triggering means mounted adjacent the receiver and connected to the adjustably positioned device for operation thereof when the target is optically aligned with the camera as viewed on the receiver, means connected to the closed circuit means for preventing operation of the triggering means except when the target monitoring receiver is operating, recording means connected to the camera, and means for rendering the recording means operative simultaneously with the triggering means.

2. The combination of claim 1 wherein the adjustably positioned device is a weapon.

3. The combination of claim 2 wherein the camera and the adjustable positioned device are mounted in fixed relation to each other on the movable mounting means and said motor means includes a pair of servo motors respectively displacing the mounting means in horizontal and vertical directions and a power source located adjacent to the camera for energization of the servo motors under control of signals generated by the control means adjacent the receiver.

4. The combination of claim 1 wherein the camera and the adjustable positioned device are mounted in fixed relation to each other on the movable mounting means and said motor means includes a pair of servo motors respectively displacing the mounting means in horizontal and vertical directions and a power source located adjacent to the camera for energization of the servo motors under control of signals generated by the control means adjacent the receiver.

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