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[54] **AUTOMATED FIRING RANGE**

[76] Inventor: **Donald E. Weihl,** 7705 W. Main St., Belleville, Ill. 62223

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[52] **U.S. Cl.** **273/105.6,** 35/25

[51] **Int. Cl.** **F41j 9/01**

[58] **Field of Search** ..... 273/105.1, 105.6, 105.2; 35/8 A, 9 A, 25; 274/11 R; 353/15

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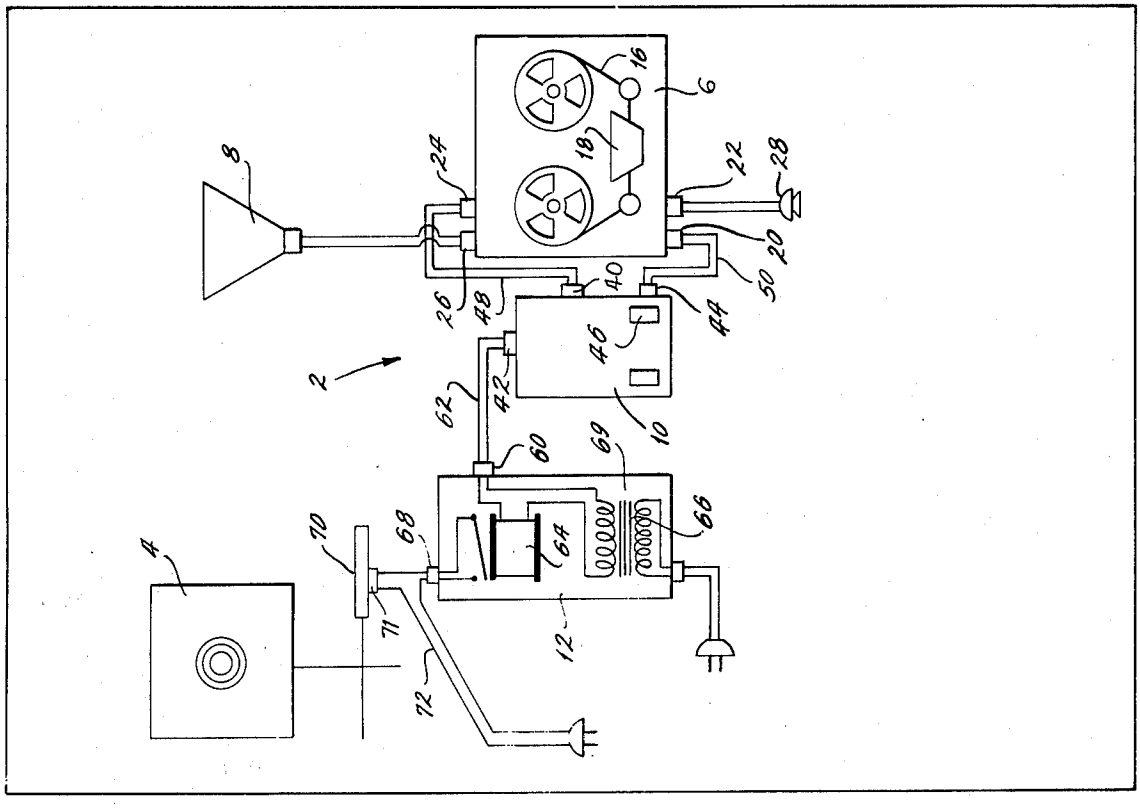
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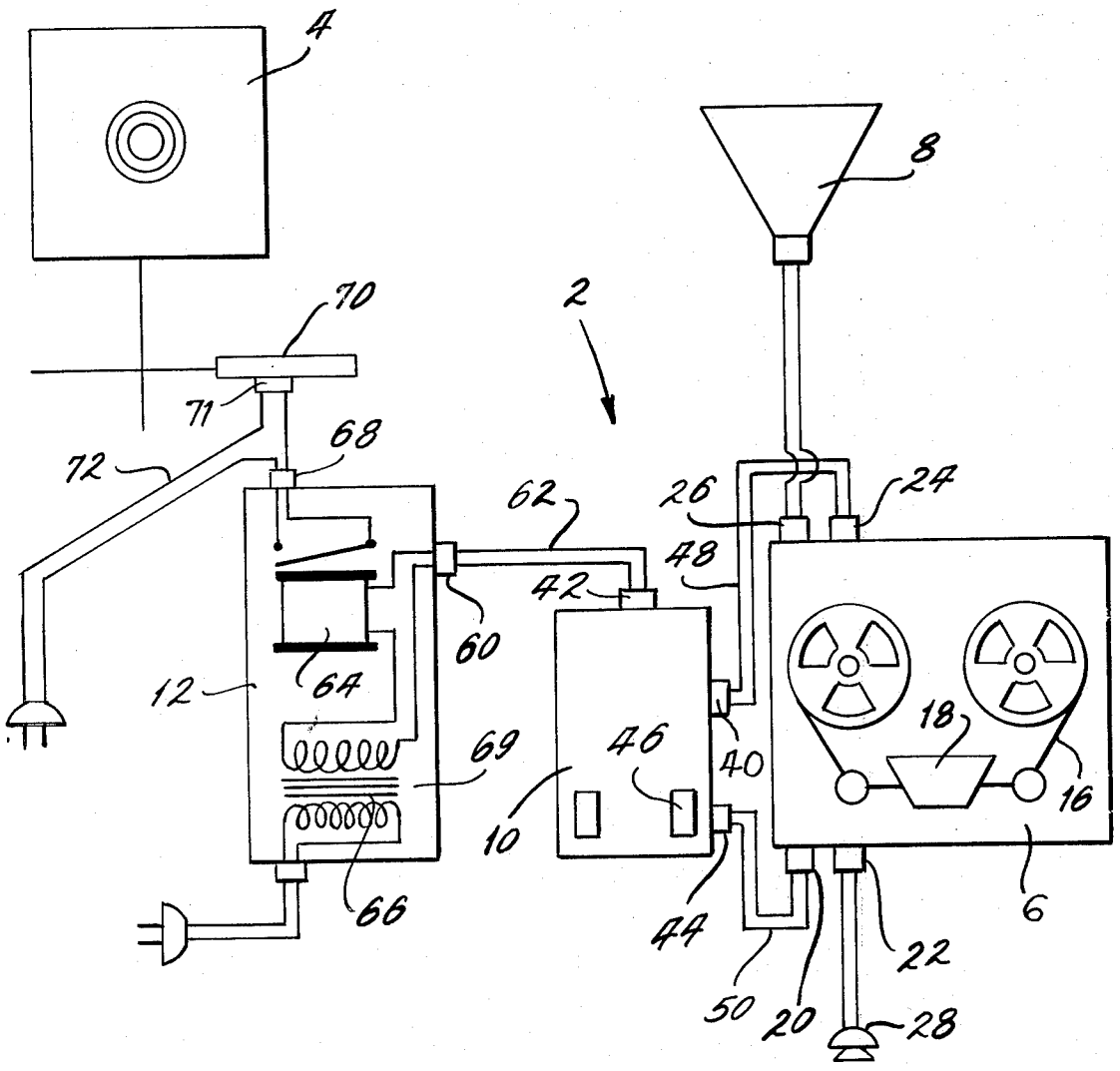
Primary Examiner—Richard C. Pinkham
Assistant Examiner—Marvin Siskind
Attorney, Agent, or Firm—Gravely, Lieder & Woodruff

[57] **ABSTRACT**

In the operation of a firing range having targets, the visibility of which is controlled by remotely operated means, firing commands are recorded on one track of a tape passing through the recording head of a dual channel tape recording and playback machine. A synchronizer is connected with the other channel of the tape machine and that device generates inaudible target signals which are recorded on the other track of the tape in properly timed relation to the firing commands. When the tape is rewound and played back, the firing commands are reproduced through a speaker connected with the tape machine, while the reproduced target signals are directed to the synchronizer which closes an electrical circuit upon receipt of them. The coil of a relay switch is in the electrical circuit, and the remotely operated means are in circuit with the relay switch. Hence, when a target signal is received at the synchronizer, the remotely operated means is energized and the visibility of the target is increased, thus enabling the user of the range to sight upon and fire at the target upon receipt of and in proper sequence with the audible firing commands.

4 Claims, 1 Drawing Figure




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AUTOMATED FIRING RANGE

This is a continuation of application Ser. No. 207,839, filed Dec. 14, 1971 now abandoned.

BACKGROUND OF THE INVENTION

This invention relates in general to firing ranges and more particularly to a process and apparatus for operating firing ranges.

Conventional rifle and pistol ranges are basically composed of fixed targets and at least one firing line, and therefore only a limited number of firing exercises may be performed on these ranges. Greater versatility is obtained by mechanizing the targets so that they turn on command of the range operator, or else by organizing the range illumination such that the targets are illuminated upon command of the range operator. In neither case is the range operation fully automated since someone must be present to issue the firing commands and control the target operation or illumination. Moreover, when the same firing exercise is repeated for different contestants, the timing between the firing commands and the target operation may well vary, and as a result some contestants may be placed at a disadvantage.

SUMMARY OF THE INVENTION

One of the principal objects of the present invention is to provide a process and an apparatus for automating the operation of firing ranges. Another object is to provide a process and an apparatus of the type stated for synchronizing oral firing commands with the visible exposure of targets. An additional object is to provide a process and an apparatus of the type stated for enabling a firing exercise to be repeated many times with precisely the same timing between the firing commands and target operation. A further object is to provide an apparatus of the type stated which is simple and inexpensive to manufacture or assemble. These and other objects and advantages will become apparent hereinafter.

The present invention is embodied in a process for operating a firing range and that process includes simultaneously recording firing commands and target signals on a recording medium. The firing commands are reproduced through a speaker, whereas the target signals are directed to a synchronizer where they close a circuit connected with a means for remotely controlling the visibility of the range targets. The invention also resides in the apparatus for performing the process. The invention also consists in the parts and in the arrangements and combinations of parts hereinafter described and claimed.

DESCRIPTION OF THE DRAWINGS

The accompanying drawing which forms part of the specification represents a schematic view of an apparatus for automatically controlling the operation of a firing range.

DETAILED DESCRIPTION

Referring now to the drawings, **2** designates an apparatus for automatically operating a rifle or pistol range having at least one target **4.** The apparatus **2** automates the operation of the range in the sense that it coordinates the exposure of the target **4** with oral firing commands and enables the same firing exercise to be repeated many times in identical form. Broadly speaking, the apparatus **2** includes a dual channel tape recorder and playback machine **6,** a speaker **8,** a synchronizer **10,** and a universal circuit **12.**

The tape recorder and playback machine **6** may be any of the many varieties currently available on the market for recording signals on a magnetic tape **16** passing through a recording head **18** on the machine and for further reproducing the signals so recorded. It is essential that the machine have two channels so that simultaneous recordings may be made in two tracks on the tape **16.** To accommodate the two channels the machine **6** is provided with a pair of input jacks **20** and **22** and a pair of output jacks **24** and **26.** The input jack **20** and the output jack **24** are connected with one channel, and the input jack **22** and the output jack **26** are connected with the other channel.

The speaker **8** is connected with the output channel **26** of the machine **6,** while the corresponding input channel **22** is connected to a microphone **28.** Thus, oral firing commands spoken into the microphone **28** will be recorded on one track of the tape **16,** and the commands so recorded will be reproduced through the speaker **8** when the tape **16** is played back.

The synchronizer **10** has a double terminal input jack **40,** output jack **42,** and recording jack **44,** and a signal switch or button **46.** The input jack **40** is connected with the output jack **24** of the tape machine **6** through a double conductor wire **48** so that signals recorded on the second channel of the tape **16** are delivered to the synchronizer **10** by way of the wire **48.** The recording jack **44,** on the other hand, is connected with the input jack **20** of the machine **6** by way of a double conductor wire **50.** The synchronizer **10** is constructed such that when the button **46** is depressed, an inaudible signal is generated within the synchronizer **10,** and this signal is delivered to the tape machine **6** through the wire **50.** Since the wire **50** is connected with the input jack **20** of the tape machine **6,** the signal is recorded on the second track of the tape **16,** and when the machine **6** is set for playback the signal is reproduced and delivered to the synchronizer **10** through the wire **48** and the input jack **40.** The synchronizer **10** is further constructed to amplify the reproduced signal delivered to it at the input jack **40,** and this amplified signal is used to close a switch, the terminals of which are connected to the output jack **42.** Thus, when the synchronizer **10** receives a signal from the recording machine **6,** the double terminal output jack **42** will conduct an electric current between the terminals thereof, but when no signal is delivered to the synchronizer **10** the output jack **42** will not conduct a current.

Devices suitable for use as the synchronizer **10** are currently available on the market and are sold for use in coordinating a tape lecture with the operation of a slide projector. They are often referred to as tape-slide synchronizers. Bell and Howell markets a suitable tape-slide synchronizer, calling it Audio Cube 766,327. Edmund Scientific Company of Barrington, N.J., also markets a tape-slide synchronizer and has assigned it Stock No. 41,222.

The universal circuit **12** includes a double terminal input jack **60** which is connected to the output jack **42** of the synchronizer **10** by a double conductor wire **62.** In addition, the universal circuit **12** includes a relay switch **64** and an electrical energy source **66** capable of energizing the coil of the relay switch **64.** The output

jack **42** of the synchronizer **10,** the coil of the relay switch **64** and the electric current source are all connected in series so that when the synchronizer **10** receives a signal from the tape machine **2** and thereby closes the switch to which the output jack **42** thereof is connected, the electrical energy source **66** will be placed across the coil of the relay switch **64** and will energize the same. The electrical energy source **66** may be batteries or a transformer connected to the mains to provide a reduced voltage for operating the relay switch **64.** The universal circuit **12** further includes a double terminal output jack **68** to which the two terminals of the relay switch **64** are connected. Thus, when the coil of the relay switch **64** is energized, the switch **64** is closed and the output jack **68** will conduct a current. The universal circuit is encased in a box **69** which may be detached from the synchronizer **10** by disconnecting the wire **62** from either the input jack **60** of the circuit **12** or the output jack **42** of the synchronizer **10.**

The target **4** is mounted such that it swivels from an exposed position wherein it faces the firing line to an unexposed position wherein it faces away from the firing line, in which case the actual target face is not visible from the firing line. The target **4** is rotated by an air cylinder **70,** and this air cylinder contains a four way valve **71** in which a solenoid is connected to the mains through double conductor wire **72.** One conductor of the wire **72** is connected with the output jack **68** of the universal circuit **12** and hence is normally interrupted by the relay switch **64.** However, when the coil of the relay switch **64** is energized, and thus closes, the solenoid in the valve **71** of the air cylinder **70** is placed across the mains, in which case it will turn the target **4.**

OPERATION

To utilize the apparatus **2** for the automatic operation of a firing range, firing commands as well as target signals must first be placed on the tape **16** in proper relation to one another. This is achieved by setting the tape machine **6** for recording and then uttering the firing commands into the microphone **28** in the proper sequence and with the correct time intervals between commands. In other words, the commands should be recorded as if they were being delivered during an actual firing exercise.

Contemporaneously with the recording of the audible firing commands on the tape **16** through the other channel of the machine **6,** target signals are recorded on the tape **16** through the other channel of the machine **6.** In particular, the audible firing commands are initiated with the target **4** facing away from the shooter and the firing line at which he stands. During the course of the firing commands, a point will occur at which the target should move to a position facing the shooter. At this point in time the button **46** on the synchronizer **10** is depressed and that button is held in the depressed position for as long as the exercise requires the target **4** to face the shooter. Then it is released. When the button **46** is depressed the synchronizer generates a signal which is delivered to the tape machine **6** through the wire **50,** and this signal is recorded on the second track of the tape **16** for as long as the button **46** remains depressed.

When depressed, the button **46** also closes the circuit through the output jack **42** of the synchronizer **10.** This in turn places the coil of the relay switch **64** across the electrical energy source **66** of the universal circuit **12,** thereby closing the relay switch **64.** The closure of the relay switch **64** places the solenoid in the valve **71** of the air cylinder **70** across the mains, and the target **4** moves to its exposed or visible position and remains there as long as the switch **64** is closed, which is, of course, as long as the button **46** remains depressed.

When the button **46** is released, the target **70** returns to its original unexposed position and the second channel of the tape **16** receives no further signal.

The button **46** is depressed as many times as there are target exposures during the firing exercise, and, of course, in proper relation to the voice commands.

To conduct the actual firing exercise, the tape **16** is first rewound on the machine **6** and then the machine **6** is set for playback. As the tape **16** advances through the recording head **18** on the machine **6,** the firing commands recorded on the first track of the tape **16** are reproduced through the speaker **8** and are clearly audible to the shooter standing at the firing line. When the firing commands reach a point at which the target is to be exposed, the target signal recorded on the second track of the tape **16** is reproduced and sent to the synchronizer **10** through the wire **48.** The target signal recorded on the second track of the tape **16** is reproduced and sent to the synchronizer **10** through the wire **48.** The target signals are amplified within the synchronizer **10** and the amplified signal closes the switch to which the output jack **42** is connected. This establishes electrical contact between the two terminals of the jack **42** and between the two conductors of the wire **62** leading to the universal circuit **12** so that the coil of the relay switch **64** is placed across the electrical energy source **66.** Consequently, the relay switch **64** closes and remains closed for the duration of the target signal on the tape **16.** The closure of the relay switch **64** places the solenoid in the four way valve **71** in the air cylinder **70** across the mains, and the air cylinder **70** moves the target **4** to is exposed position, that is the position facing the firing line. The air cylinder **70** holds the target **4** in the exposed position for the duration of the signal, and once the signal passes, the relay switch **64** opens and the target **4** moves back to its initial unexposed position by reason of the action of the four way valve **71** which is an integral part of the air cylinder **70.** When the relay switch **64** is opened, the solenoid in the four way valve **71** is returned by a coil spring action which causes compressed air from a supply tank **74** to enter the opposite end of the air cylinder **70.** This in turn moves the target **4** back to its initial unexposed position.

In lieu of the air cylinder **70** the target **4** may be operated by an electric motor. In such a case the motor would be controlled by limit switches, and the forward and reverse switches of the motor in turn would be connected to and controlled by the relay switch **64.**

Similarly, the apparatus **2** may be utilized to operate range lights instead of an air cylinder **70.** In that case the lights would be connected to and controlled by the relay switch **64,** and no need would exist for the targets **4** to move for their exposure would be dependent on the operation of the range lights.

This invention is intended to cover all changes and modifications of the example of the invention herein chosen for purposes of the disclosure which do not constitute departures from the spirit and scope of the invention.

What is claimed is:

1. A firing range comprising: a tangible target of fixed size and shape which is movable between a generally obscured position and a highly visible firing position; target positioning means for physically moving the target between its obscured and firing positions; a recording and playback machine through which a single recording medium passes, the machine being capable of simultaneously recording two different commands on separate tracks of the recording medium, and further being capable of reproducing those different commands in the same sequence and time intervals as they were recorded; a microphone connectable to the machine such that audible firing commands directed into the microphone are recorded on one of the tracks of the recording medium; a speaker connected with the machine for emitting the audible commands recorded on said one track when they are reproduced by the machine; synchronizer means capable of generating inaudible commands, the synchronizer means being connected to the machine such that the inaudible commands are recorded on the other track of the recording medium and such that the inaudible commands when reproduced by the machine are received by the synchronizer means, the synchronizer means further being capable of amplifying the reproduced inaudible commands and being connected to the target positioning means for causing the target positioning means to physically change the position of the target when an inaudible command is received thereby.

2. A firing range according to claim 1 and further characterized by a relay switch interposed between and connected with the synchronizer means and the target positioning means; and wherein the amplified inaudible command constitutes an electrical current capable of actuating the relay switch.

3. A firing range according to claim 2 wherein the relay switch is contained in a package separate from the synchronizer means and is detachable from the synchronizer means.

4. A firing range according to claim 1 wherein the recording medium is a tape.

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