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[54] **AUTOMATIC TARGET CONTROL SYSTEM**
10 Claims, 3 Drawing Figs.

[52] **U.S. Cl.** ..... **273/105.6,** 242/54 R
[51] **Int. Cl.** **A63b 63/06**
[50] **Field of Search** 273/105.6; 242/54

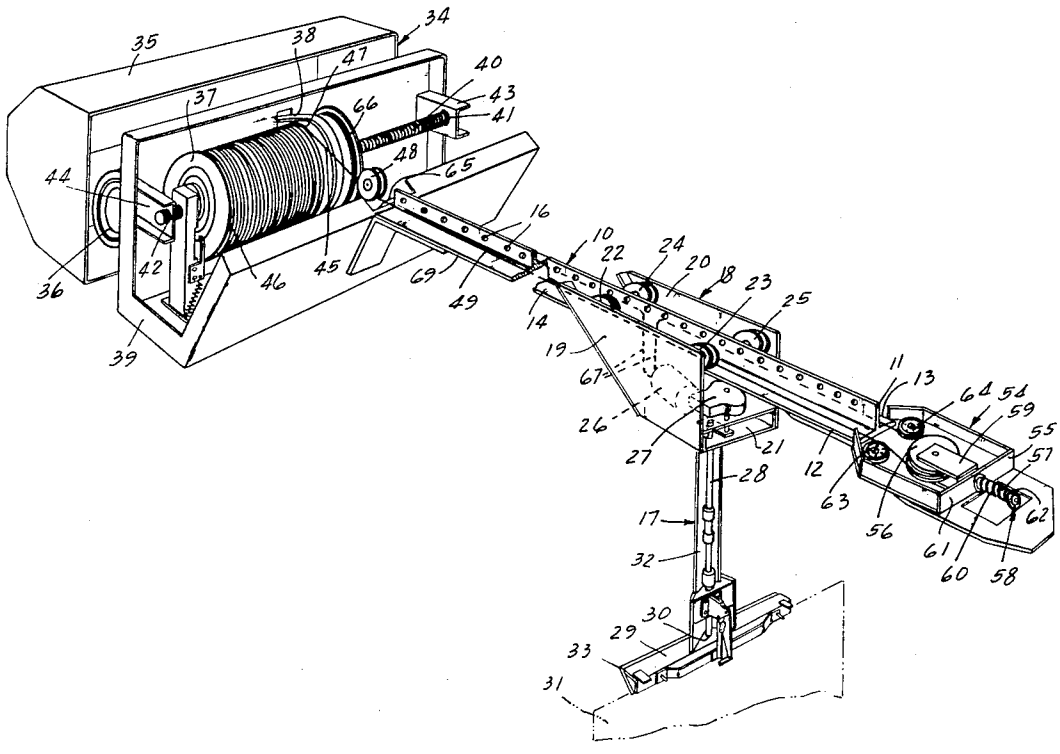
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ABSTRACT: A target carrier system including a target carrier which is mounted for longitudinal movement along a track and which has means for manipulating the target. The target carrier includes a target turner motor which is moved with the target along the carrier track by means of a cable drive system. The cable drive system includes a housing which supports a cable spool on a threaded shaft. The shaft is fixedly positioned within the housing, and means are provided to rotate the cable spool, thereby allowing the spool to translate along the threaded shaft. The threaded shaft is positioned generally perpendicularly of the carrier track so that the cable spool is translated in such a manner as to allow a cable to unwind from the spool at a point which is generally fixed with respect to the track. The cable which drives the target carrier is wound about the cable spool, and a loop portion of the cable extends along the length of the track and is fixed to the target carrier to move the same as the spool rotates. This cable is an electrical conductor and is coated with an electrical insulating material to allow the conductor to act both as the drive force for the target carrier and also as the power line to the target turner motor. The carrier track also has an insulation lining which acts to insulate and guide the cable in its sliding movement along the track.



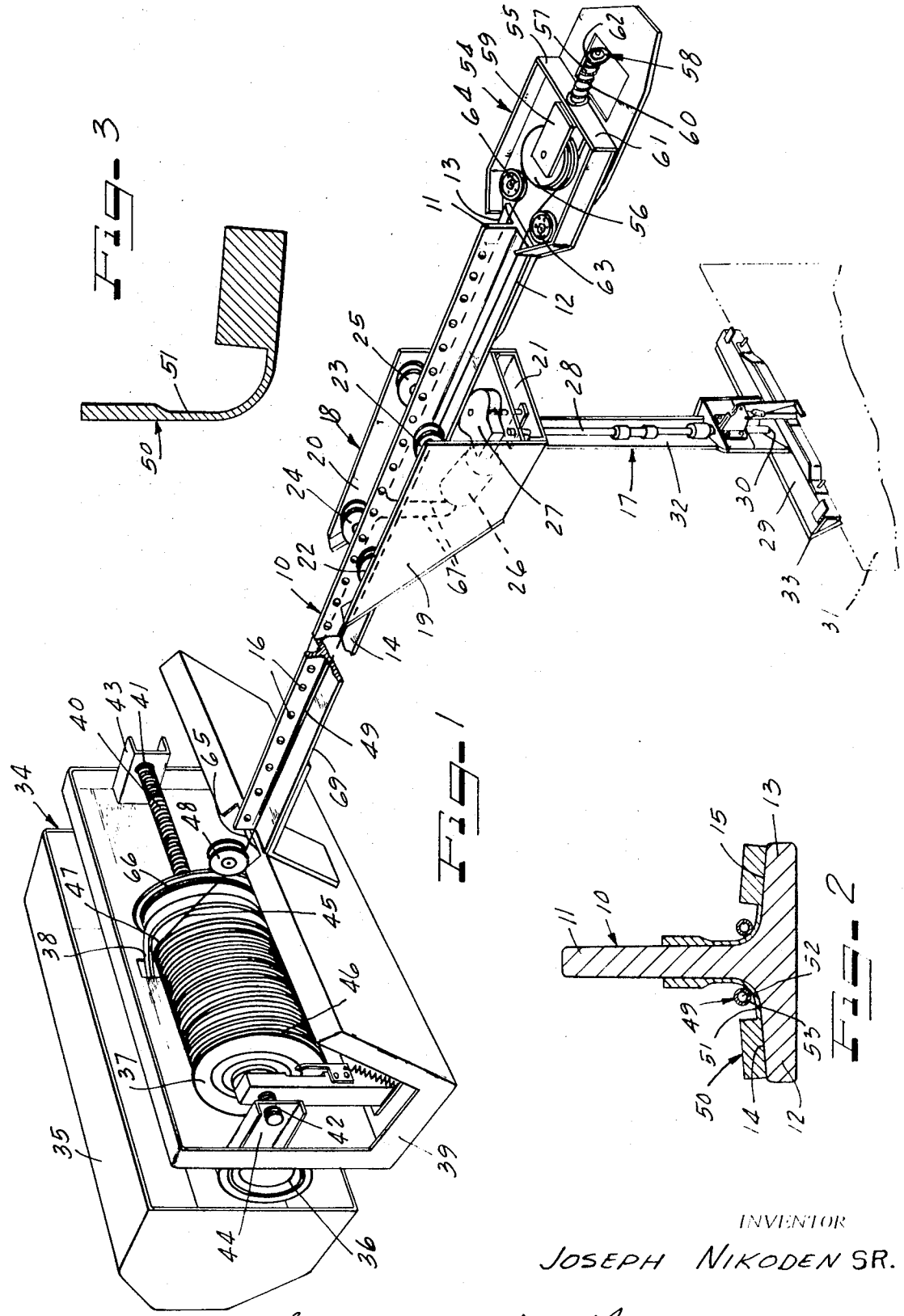


FIG. 1

FIG. 2

FIG. 3

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AUTOMATIC TARGET CONTROL SYSTEM

BACKGROUND OF THE INVENTION

Field of the Invention

The field of art to which this invention pertains is target carrier systems and in particular to target carrier systems for shooting ranges in which a target carrier is moved along a track and is pivoted or otherwise manipulated during its movement by an electrical control mechanism which is mounted to a housing associated with the target carrier.

SUMMARY OF THE INVENTION

It is an important feature of the present invention to provide an improved target carrier system for a shooting range.

It is another feature of the present invention to provide a target carrier system which has a minimum number of moving parts, which is economical to construct and which has low maintenance requirements.

It is an important object of the present invention to provide a target carrier system having a target carrier which is movable along a rack or rail and which is driven therealong by a cable which is also the means for supplying electrical power to the target carrier.

It is another object of the present invention to provide a target carrier system having a target carrier which employs a target turner motor mounted on the target carrier housing wherein the target turner motor is movable with the housing along the carrier track and is driven in its path of movement by the electrical conductor which supplies energy to the target turner motor.

It is also an object of the present invention to provide a target carrier system which utilizes a spool having an electrical conductor helically wound about the spool and having a loop portion of the electrical conductor extending along the length of a carrier track to drive a target carrier longitudinally thereof as the spool is rotated.

It is an additional object of the present invention to provide a target carrier system as described above wherein the spool carrying the electrical conductor is threadedly mounted on a shaft which permits controlled translation of the spool as the spool unwinds and thereby maintains a generally fixed relationship between the point of release of the cable from the spool and the track which carries the target carrier.

It is another object of the present invention to provide a track for a target carrier as described above wherein the track has a generally T-shaped configuration for supporting an electrical conductor which is used to drive the target carrier along the track and which is used to supply power to the target carries turner motor.

It is also an object of the present invention to provide a target carrier system as described above wherein the electrical conductor used to drive the target carrier has an insulation coating which is flexible and wherein the material forming the electrical conductor is stranded wire.

It is another object of the present invention to provide a target carrier system as described above and employing a pair of insulation linings with wire receiving grooves formed along the length thereof and wherein the linings are positioned at opposite upwardly extending faces of a T-bar which forms the carrier track.

These and other objects, features and advantages of the invention will be readily apparent from the following description of a preferred embodiment thereof, taken in conjunction with the accompanying drawing, although variations and modifications may be effected without departing from the spirit and scope of the novel concepts of the disclosure

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a perspective view of a target carrier system of the present invention showing the cable spool as mounted on its threaded shaft for feeding cable to a carrier track to move a target carrier along the length of the track and at the same time supply electrical power to a target turner motor which is moved with the target carrier.

FIG. 2 is a cross-sectional view of the carrier track utilized in the present invention and showing the positioning of the insulation linings and the insulated cable used to drive the target carrier along the T-bar track.

FIG. 3 is a sectional view of the insulation lining which is utilized along the carrier track and which has a groove therein for slidably guiding the insulated drive cable.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The target carrier system of the present invention provides an improved means for driving a target carrier along a track and at the same time for supplying electrical power to the target carrier to manipulate the same as it moves along the track and thereby provide various target objectives.

It is customary in target systems such as may be employed in police shooting ranges or the like to provide a target which moves either toward or away from the shooting position and which also pivots or moves at an angle with respect to the shooting position as it travels along its predetermined path. In fact, it is often the case that target systems of this type are controlled electronically in such a way as to permit each shooter to increase or decrease the speed of his target, to adjust the range, to edge, face or return the target to the setup point for scoring and safe changing of the target.

In order to accomplish these various maneuvers the target carrier device which moves along its track must have self-contained motors or other control devices which move with the target.

In a shooting range such as might be found in a range provided for low enforcement training courses, a target carrier must undergo continuous movement along a track and at the same time must be conducting electrical power to a target turner motor, for instance. In the past, the coupling of power to the turner motor has generally been accomplished by sliding electrical contacts. In such cases, an electrical wire is suspended adjacent to the moving target and a contact is slid along the electrical wire to couple power to the target turner motor. However, such repeated movements of the target generates wear and results in loosening of the contacts with the wire and dirt collection between the contacts, all leading to high maintenance costs as well as to disruptive failures.

The present invention provides a target carrier system which eliminates the need for sliding contacts and which through a combination of features provides a single means for both driving the target carrier and for supplying power to the target turner motor.

In the device of the present invention, an electrical conductor is used to physically move the target carrier along its carrier track and at the same time conduct electrical power to the target turner motor. The system used in the present invention to unwind and wind the electrical cable is arranged to provide minimum flexing of the cable as the spool winds and unwinds.

Referring to the drawings in greater detail, FIG. 1 shows a carrier track **10** which consists of a T-bar having an upstanding portion **11** and a pair of outwardly extending flanges **12** and **13**. The flanges **12** and **13** have upwardly facing surfaces **14** and **15** as shown in FIG. 2. These upwardly facing surfaces provide the support means for the cable which is moved along the carrier track **10**. A series of holes **16** in the upstanding portion **11** provide means for securing the track to a ceiling or other suitable fixture.

A target carrier **17** is suspended from the carrier track as shown in FIG. 1 and includes a target carrier housing **18** which has a pair of sidewalls **19** and **20** and a base wall **21**. The carrier housing **18** is supported on the flanges **12** and **13** of the carrier track **10** by a series of rollers **22**, **23**, **24** and **25**. By means of these rollers, the housing **18** can move freely along the length of the track as required. It should be understood that FIG. 1 is a perspective view and that the carrier track **10** normally would be substantially longer than is indicated in FIG. 1.

The target carrier housing **18** contains a target turner motor **26** and a suitable control mechanism **27** which may be used to convert the rotary motion of the motor **26** into a controlled

pivotal movement of the target. Such target turner systems are well known in the art and need not be illustrated here in further detail.

The control device **27** is coupled to a shaft **28** which extends directly to a target clamp **29** as at the point **30**. The target clamp **29** may be of any suitable type for readily clamping a target **31** thereto. Both the shaft **28** and the clamp **29** may have suitable bullet deflector shields **32** and **33** respectively. These bullet deflector shields control the angle of deflection of lead fragments for safety purposes as is well understood.

The means for driving the housing **18** along the track **10** consists of a motor drive an cable spool assembly **34**. The assembly **34** includes a housing **35** for an electric motor **36** which drives a cable spool **37** by means of a friction drive belt **38**.

The cable spool **37** is mounted in a housing section **39** and is supported on a threaded shaft **40**. The threaded shaft **40** is fixedly mounted as at **41** and **42** within outwardly extending support arms **43** and **44**. The threaded shaft of rod **40** is fixed in the arms **43** and **44** so as not to be rotatable.

A cable **45** is helically wound about the cable spool **37** from a first end **46** to a point **47** which is the point to takeoff of the cable from the spool. The cable passes beneath a guide pulley **48** and extends along the track **10** as at **49**.

The track **10** has insulation linings **50** disposed along the length thereof. The insulation linings **50** are shown in FIGS. **2** and **3**, but have been omitted from FIG. **1** for clarity. The linings **50** consist of an insulation material such as vinyl or the like and are provided with a recess **51** which supports the cable **49**.

As shown in FIG. **2**, the cable **49** consists of a threaded conductive core **52** and an insulation coating **53**. The combination of the threaded core and the flexible insulation coating provide a flexible cable which can sustain the repeated windings and unwindings from the spool **37**. Also, by using the rollers **22** through **25** in conjunction with the insulation linings **50**, the target carrier housing **18** can be moved easily along the track, and the cable **49** provides sufficient strength to transport the target carrier without strain along the track **10**.

The cable **49** extends from the takeoff point **47** along the track **10** as shown adjacent the flange surface **14** to a cable take up device **54**. The cable take up device includes a housing **55** which has a main pulley **56** spring loaded as at **57** to provide a suitable tensioning of the cable **49**. The spring loading is accomplished by means of a pin **58** which is coupled to the pulley holder **59** and which has a coil spring **60** disposed between a rear surface **61** of the housing **55** and a radially enlarged portion **62** of the pin **58**.

The housing **55** also contains a pair of guide pulleys **63** and **64**. The cable **49** extends adjacent to both the guide pulleys and around the main pulley **56** as shown. From this point the cable extends along the surface **15** of the flange **13** as shown in FIG. **2** and returns at a point **65** to be wound around the spool **37** as at **66**.

The cable is fixed to the target carrier housing **18** so as to physically move the housing **18** when the cable moves due to the winding or unwinding of the spool **37**. Also the cable **49** extends to the target turner motor **26** as shown at **67** to control the operation of the motor and the manipulations of the target **31** as it moves along the track **10**. In this way, sliding contacts along the track are avoided and a system is provided which effectively reduces the cost and maintenance of the target carrier system.

In operation, the motor **36** is controlled so as to rotate the cable spool **37** in one of the two possible directions thereby to move the cable **49** either away from or toward the takeoff point **47**. Assuming it is desired to move the target carrier housing **18** from the point shown to a point **69** along the track **10**, the spool would be rotated clockwise as shown in FIG. **1**. The unwinding of the cable **49** at the point **47** would be associated with a corresponding winding of the cable in the area **66** of the spool, thereby maintaining the cable slack free at all times. The winding of the cable in the vicinity **66** of the spool would cause the portion of the cable which extends along the face **15** of the track **10** to move to the left in FIG. **1**, thereby transporting the target carrier housing **18** in the direction of the point **69**.

The target turner motor may be operated by passing a signal of a suitable type through the electrical conductor to control the pivotal action of the shaft **28** and hence of the target **31**.

It will be understood that as the spool **37** rotates clockwise, it moves toward the right in FIG. **1** thereby maintaining the takeoff point **47** adjacent to the track **10** thereby minimizing the flexure required of the cable **49** during the winding and unwinding process. It will also be understood that the friction drive belt **38** will track along the surface of the spool **37** to maintain its alignment with its drive point at the motor **36**.

I claim as my invention:

1. A target carrier system comprising:
a carrier track,
a target carrier mounted for longitudinal movement along the carrier track,
electrical control means associated with said target carrier and being movable therewith along said carrier track and being operable to turn said target carrier,
cable supply means and means for coupling cable therefrom to said target carrier,
means associated with said cable supply means for extending and retracting cable therefrom to transport said target carrier along said track,
said cable being an electrical conductor, and
means coupling power through said electrical conductor to said target carrier electrical control means.

2. A target carrier system in accordance with claim **1** wherein said electrical control means comprises a target turner motor and wherein said electrical conductor cable is electrically connected to said target turner motor for operating the same.

3. A target carrier system in accordance with claim **1** wherein said cable supply means comprises a cable spool having a cable helically wound thereon, said cable having a loop portion formed intermediate the cable ends, said loop portions extending to and from said target carrier and being secured to the target carrier to transport the same along the track, means for rotating the spool so as to extend cable along one side of the loop and absorb cable along the other side thereof, and means positioning said loop along said track thereby causing said target carrier to move along the track as the spool rotates.

4. A target carrier system in accordance with claim **3** wherein a frame means is provided to support said cable spool, said frame being fixedly mounted relative to said carrier track, a threaded rod supported in said frame, said cable spool being threadedly received on said rod whereby rotation of said spool causes said spool to translate along said rod and thereby maintain a fixed relationship between the takeoff position of cable from the spool and the position of said carrier track.

5. A target carrier system comprising:
a target carrier and means for supporting the same for movement along a predetermined path,
means for coupling a cable to said target carrier and for using said cable to transport the target carrier along said predetermined path,
electrical control means associated with said target carrier, and said cable further supplying electrical power to said electrical control means which is then operable to actuate the target carrier into various desired movements.

6. A target carrier system in accordance with claim **5** wherein said electrical conductor is formed of stranded conductor wire and is coated with a flexible insulating material and wherein said carrier track has an electrical insulation lining extending along the length thereof, said electrical conductor being slidably movable on said insulation lining.

7. A target carrier system in accordance with claim **6** wherein said carrier track comprises an inverted T-bar, said cable being carried on upwardly facing surfaces of the T-bar and said electrical insulation linings being provided on both said upwardly facing surfaces.

8. A target carrier system comprising:
a carrier track,
a target carrier suspended from the track and being mounted for movement along the track,
said target carrier having a target turner motor mounted thereon for pivoting the target carrier as required
a cable spool mounted for rotation for feeding cable to one end of the track,
a length of cable wound about said cable spool,
a portion of said length of cable extending along said track and being fixedly secured to said target carrier,
cable take up means positioned adjacent the end of the track oppositely of said cable spool,
said portion of said length of cable extending from said target carrier through said cable take up means, and returning along said track to said cable spool,
means for rotating the cable spool to cause cable to unwind from one portion thereof to feed cable to said target carrier and to wind at another portion thereof to absorb slack generated by translation of said target carrier along said track,
said cable being an electrical conductor and being electrically coupled to said target turner motor, and
means for supplying a signal through said cable to actuate said target turner motor.

9. A target carrier system in accordance with claim 8 wherein said carrier track comprises a T-bar inverted to expose oppositely extending upwardly facing flanges, a pair of lengths of track insulators extending along the T-bar and having a longitudinal recess formed therein to slidably guide said cable along said flanges of the carrier track.

10. A target carrier system in accordance with claim 8 wherein means are provided to move said spool generally perpendicularly of said carrier track at a rate which allows the take off point of cable from the spool to be substantially fixed relative to the carrier track thereby reducing the flexure of said electrical conductor during movement of said target carrier.