ADAPTER

OBJECT OF THE INVENTION

This invention refers to an adapter device for mounting a wide range of accessories on a firearm.

STATE OF THE ART

In general, portable long barreled firearms that use long range ammunition are probably the most widely used personal guns today.

Long barreled guns leave the factory, for example, with a basic aiming system, which can subsequently be equipped with a wide range of accessories that facilitate its use and maintenance in different scenarios.

All of these accessories can be assembled on the long barreled gun separately or in combination, but there is a drawback for the long gun in question related to alterations in the original configuration, on occasion even with changes of the original long gun parts and/or significant alterations in size and weight.

CHARACTERIZATION OF THE INVENTION

This invention seeks to solve one or more of the abovementioned drawbacks by means of an adapter device for mounting accessories on a portable long barreled firearm, such as the one claimed in claim 1.

One object of the adapter device is to assemble accessories on the portable long barreled gun with minimum modifications of the basic structure of the gun and with minimum variation of its total weight.

Another object of the adapter device is to supply a very simple adapter that is easily assembled on the original firearm or that can be adapted to a gun already in use.

Still another object is to provide an adapter device that has a polyhedral shape, such as a hollow rectangular tube open at both its top and its bottom, which comprises some first mechanical means of mechanical assembly externally distributed on the short sides of the adapter device, i.e., on the side that faces the muzzle of the barrel and on the side that faces the trigger guard; and some second gun, mechanical means distributed on the interior sides of the adapter device to receive the cartridge storage element or magazine.

Another object of the adapter device is that it is configured to be located close to the region where cartridges are supplied to the gun. Thus, the adapter device can be placed on top of the mouthpiece of the magazine of a gun in use, i.e., the adapter device does not replace the existing magazine mouthpiece, but rather the adapter device is configured in the form of a clamp assembly that is externally assembled around the mouthpiece of the gun magazine. Likewise, the adapter device can also be configured to be directly assembled on the frame of the portable gun, replacing the magazine mouthpiece of the in-service gun.

The adapter device includes a closed hollow receptacle that is configured to insulate any gun accessory or element thereof that is inserted into this receptacle from the environment in which the long barreled gun is used.

This receptacle is assembled on the exterior of one of the sides of the adapter device, such that it does not interfere with the handling of the gun.

Still another object of the adapter device is that the receptacle can be a body that is substantially rectangular, cylindrical, oval, etc., and that is configured as an impermeable compartment, i.e., that is resistant to the penetration therein of a liquid, gaseous and/or solid substance.

The receptacle also comprises an input-output interface that enables communication between a gun accessory or element thereof housed inside the

receptacle and any component of the gun or part thereof, any gun accessory and/or any element of an accessory mounted on the exterior of the receptacle.

BRIEF DESCRIPTION OF THE FIGURES

A more detailed explanation of the invention is provided in the following description and is based on the accompanying figures:

figure 1 shows a perspective view of the adapter device installed on a long barreled gun.

figure 2 shows a detailed perspective view of the adapter device.

figure 3 shows details of the adapter device installed on a long barreled.

figure 4 shows a detailed perspective view of the adapter device that can be placed on top of the mouthpiece of the long barreled gun.

DESCRIPTION OF THE INVENTION

Figure 1 shows a portable long barreled firearm 11 with an adapter device 13 for mounting accessories or elements thereof, which comprises a closed hollow receptacle in which an accessory or element thereof is housed. The adapter 13 is placed on top of the mouthpiece of the cartridge storage element 12 or gun magazine and/or can replace the mouthpiece proper of the magazine 12. It can be seen that the receptacle is on one of the sides of the adapter device 13 closest to the barrel muzzle, such that it does not interfere with the handling of the gun.

Regarding figures 2 to 4, the adapter device 13 has a substantially hollow rectangular tube shape and comprises some first mechanical means 21-1, 21-2 externally distributed on the short sides of the adapter device 13, i.e., on the

side that faces the barrel muzzle and on the side that faces the trigger guard. The adapter device 13 also comprises some second mechanical means 41 distributed on the interior sides of the adapter 13 to receive the magazine 12 and, as mentioned above, it includes the closed hollow receptacle 23 that is configured to insulate any gun accessory or element thereof inserted into this receptacle 23 from the environment in which the long barreled gun 11 is used.

Therefore, the adapter device 13 is substantially shaped like a hollow rectangular polyhedron, open at both its top and its bottom.

The receptacle 23 can have different shapes, such as a substantially rectangular parallelepiped, a cylinder, etc., configured as an impermeable compartment, i.e., that is resistant to the penetration therein of liquid, gaseous and/or solid substances.

In a scenario in which the receptacle 23 is not impermeable or losses its impermeableness, each accessory or element thereof can be coated with a material that provides the required characteristic of insulation with respect to a polluting environment that interferes with proper operation.

Obviously, the characteristic of impermeableness of the receptacle 23 is created once the gun accessory or element thereof has been inserted into the receptacle 23.

In a scenario in which the adapter device 13 cannot be directly and mechanically placed on top of the gun magazine mouthpiece, the adapter device 13 is mechanically assembled to the gun frame itself with the first mechanical means 21-1, 21-2.

The receptacle 23 also comprises an input-output interface that enables communication between an accessory or element thereof housed inside the

receptacles 23 and any component of the gun or part thereof, any gun accessory and/or any element of an accessory mounted on the exterior of the receptacle 23.

The adapter device 13 includes an electric power supply source that supplies electric power to all the accessories or elements thereof housed in the receptacle 23.

The adapter device 13 includes a switching element 22 to turn on and off the gun accessory and/or element thereof. To this end, the switch 22 is electrically connected to the accessory mounted inside the receptacle 23.

The switch 22 is located on the exterior of one side of the adapter device 13, such that it can be actuated by one finger of the hand of a potential user of the long barreled gun

The adapter device 13 is assembled close to the gun chamber, as it is placed on top of the gun magazine mouthpiece. This location allows the receptacle 23 to house accessories or accessory elements for counting the ammunition consumed by the gun during use, for example, since the shot counting systems include elements that are installed in the magazine 12 proper and/or close to it, in the vicinity of the chamber, etc.

Therefore, accessories for the portable long barreled gun, like a shot counter device, rate of fire detector device, counter device of cartridges stored in the gun magazine 12, etc., can be installed in the adapter device 13.

The receptacle 23 also includes accessory elements related to a display device 14, 31, a transceiver to emit and receive data signals regarding the gun's use, etc.

Any of the aforesaid devices comprises at least one electronic control unit

connected to an element to turn it on and off, a data input and output unit, a transmission and receiver unit, i.e., a transceiver to transmit and receive, via short range radio, data signals regarding the function performed by the device with which it is associated, an electric power supply source, a data storage unit or memory, etc.

The data input and output unit can be electrically connected to other elements of the corresponding accessory installed anywhere on the long barreled gun via the input-output interface.

For example, the electronic control unit can transmit data on the function or functions that it performs during use of the long barreled gun, via the transceiver, to a receiver installed in the information display device 14, 31. This display device 14, 31 may be located in the region of the mouthpiece or in a remote position that facilitates display during use of the gun.

The display device 14, 31 may comprise a fixed or blinking light signal and/or an alphanumeric display screen, a micro-controller, a power supply source, a receiver to receive the information to be displayed, an operating mode selector, etc. These functions can be controlled from the central control unit located in the receptacle 23.

The display device 14, 31 located in a region away from the gun may be compatible with multiple supports available on the market which are acquired as standard complements of a long barreled light gun, e.g., Picatinny rails, clamps, etc., or may be adapted to the gun physiognomy.

The body of the display device 14, 31 may have a cylindrical shape, with a reduction of the cylinder radius in the centre to facilitate the grip with clamps. In this way, the long barreled gun could be placed in multiple positions on a Picatinny rail at the user's discretion.

The cylindrical geometry also enables the display device 14, 31 to rotate on the

axis of the cylindrical structure, permitting its orientation for a correct, easy display of the light signal or the display screen.

Because of the cylindrical shape of the body of the display device 14, 31 and a recess that is made, there are two well differentiated parts. The electronics for processing the information and the display are housed in one part and the battery in the other. This means that, if screwed caps with O-rings are introduced, exchangeable batteries can be incorporated, making the device resistant to immersion in water.

For many applications, all the components incorporated into the gun must be perfectly fitted to its morphology and not protrude from it. Therefore, the display device 14, 31 must be located in an area within the user's range of vision, with mechanical characteristics that make it imperceptible to other users and that permit use of the gun in any normal situation. Therefore, the telescope may be located on the body of the gun, near the region where the sight is installed. Many portable guns have built-in grips that can be used for the installation of the display device 14, 31.

To prevent the display device 14, 31 from protruding from the gun structure, it has a "U" shape whose external surface may come into contact with the user and is as flat as possible, following the lines of the gun's curvature. With this shape, it is possible to orient the display 14, 31 and/or the light signals towards the user, and the battery can be concealed in the areas not covered by the user's field of vision, e.g., in the concealed grip area. To prevent difficulties in the case of a right-handed or a left-handed user, the U-shaped body facilitates the rapid relocation of the device so that it will not affect or bother the user when using the gun.

The display device 14, 31 of the information saved in the central control unit memory, in addition to being located on the gun, may be located in an external control unit that has its own display system, e.g., a PC, a PDA or a

mobile telephone.

The control of the light gun may require accessories which include a vibration sensor, a temperature sensor, a movement sensor, an optic sensor, a magnetic sensor and a transceiver to emit signals of data measured by the sensors and receive data signals of information stored in the central control unit external to the firearm.

The sensors installed in a position away from the mouthpiece are connected to a transmitter to send the data signal produced by the sensor to the transceiver, which transmits it to the central control unit.

Thus, the central control unit receives the information from all the gun sensors, it processes the received signals and it generates a data file regarding the use of the gun that is stored in a storage unit.

The temperature reached by the barrel and the stress to which it is subjected depend on the use made of the long light gun. Therefore, for purposes of good gun maintenance, it is necessary to know the total number of shots made with it and how many of these have been made in each type of use.

For example, the vibration or movement sensor substantially near the mouthpiece picks up any vibration caused by a shot, it generates a data signal associated with the detected shot and, via the transceiver mounted in the receptacle 23, this is transmitted to the central control unit, which will process the received information, determine if a shot has occurred and store the event in the memory.

The central unit, with the consecutive information received from the vibration or movement sensor, is able to determine the rate of fire and the mode of use of the long light gun: manual, semiautomatic or automatic.

The temperature sensor is located on an area of the long light gun away from the

mouthpiece; therefore, the temperature sensor communicates via a transmitter connected to it with the central unit to transmit a data signal associated with the temperature reached by the barrel whenever a shot occurs. The central unit memory stores the corresponding datum with the data on the rate of fire.

The optic and magnetic sensors are located along the mouthpiece and close to the chamber to provide efficient counting of the number of cartridges in the magazine 12.

In the case of the magnetic sensors, the notch of the magazine 12 is detected in each of its positions. For this purpose, a magnet is incorporated into the notch so that the magnetic sensors will provide a reading of the magnet field based on its position. The position depends on the number of cartridges stored in the magazine 12.

The sensors send this information to the central control unit via the transceiver housed in the receptacle 23. The central unit processes and determines the number of cartridges in the magazine 12. Due to the difficulty of access to the region next to the chamber and to increase the accuracy of the count of cartridges existing in the magazine 12, two magnets are installed in the notch in different positions, in the direction of the upward movement of the notch. Thus, even in the scenario in which the notch is near the chamber – last cartridge – one of the magnets continues to provide information on its position and the number of cartridges left in the magazine 12 can be accurately estimated.

In the case of long light guns, there are several technical problems associated with achieving an efficient cartridge count, e.g., the range of magazines available on the market with different shapes and made of different materials. To solve the aforesaid problems, the central control unit is adapted to

identify the type of magazine 12 and, depending on the identification made, to interpret the information provided by the sensors. The memory stores the range of theoretical values of the signal that each sensor can provide on the basis of the material the magazine 12 is made of. When an event – a shot – occurs and the sensors are actuated, these send the detected signal to the microprocessor of the central unit for it to compare the received data with the values stored in the memory, to identify the magazine 12 and to estimate the number of unused cartridges left inside the magazine 12.

The user can indicate to the central control unit the need to display the information stored in the memory by means of an actuation pushbutton. It may also be necessary to actuate the display system in the event of reception of a signal of events recorded by the sensors that require fast communication to the user, such as in the case of cartridge counts. When this occurs, the micro-controller of the central control unit processes the instructions and sends the required information to the information receiver for it to be displayed; the information may be displayed by a light signal, an alphanumeric screen or both.

The display device 14, 31 incorporates a selector of the operating mode. With the selector, we can decide how we want to display the information depending on the ambient illumination. Thus, we can choose between displaying information in the visible spectrum in the case of daytime use or in the infrared spectrum in the case of night-time use. To save energy in the display 14, 31, it can be turned off separately from the mouthpiece, keeping the information saved in the central control unit refreshed during its use.

When the display device 14, 31 is located in an area away from the central control unit, wireless data transmission is established between the two components. The transmitters and receivers are tuned to 125 kHz, the radio frequency for short range communications. This prevents interference between users of different guns with the same type of light gun control device

installed. Moreover, tuning the transmitters and receivers to 125 kHz reduces the electric power consumption because it is possible to establish an inductive type of connection. The same frequency of 125 kHz is used to establish communications between sensors located in regions away from the mouthpiece. To differentiate the two communications, when the central control unit receives the information via the information receiver of the sensors, a communication protocol is established such that the micro-controller differentiates between the two signals and knows the instructions to be sent to the rest of the components.

In the case of communication between the central control unit and the external control unit, the communication is established via transmitters and receivers tuned to 2.4 GHz. The range at this radio frequency is up to about 85 meters, which enables remote control of the use of long light guns and information display during their use.

To achieve a long durability of the batteries of the device for the control of long light guns, an orderly on and off sequence of the different electronic components is established by means of micro-controllers. In addition, the receivers always stay active in a low consumption mode; only the receiver of the information to be shown on the display device 14, 31 located in a region away from the gun may remain off if the user has so indicated with the operating mode selector. The micro-controllers are in low consumption (sleep) mode until they receive a signal of an event or request for display of the information saved in memory.

If the signal comes from the external control unit that requests the reading of the information saved in the memory of the central control unit via the transmitter of the external control unit, the micro-controller actuates the memory where the information is saved, reads the saved information and sends it to the external control unit via the transmitter of the saved information. The rest of the

components remain turned off or in sleep mode. When the process ends, it disables all the components except for the receivers, and the microprocessor returns to sleep mode.

The external control unit can request that the data saved in the memory of the central control unit be refreshed, deleted or changed. In this case, the instructions and the possible new data to be entered are received by the receiver of information and instructions coming from the external control unit. The micro-controller of the central control unit is actuated, it processes the information and it sends instructions to refresh, delete or write new data into the memory. When the process ends, it disables all the components except for the receivers, and the microprocessor returns to sleep mode.

If the microprocessor receives a signal from a sensor located in the mouthpiece or a sensor located in a region of the gun away from it, the microprocessor wakes up, reads the information, turns on the memory where the parameters of the long light gun are recorded, compares them and determines whether an event has occurred. If so, it refreshes the information in the memory where the occurred events are stored by use. When the process ends, it disables all the components except for the receivers, and the microprocessor returns to sleep mode.

If the signal comes from the user via the actuation pushbutton,requesting to see the information in the display device 14, 31 located on the long light gun, the microprocessor wakes up, processes the information requested by the user, retrieves it and sends instructions to the display device 14, 31 via the transmitter of the information saved in the memory tuned to 125 kHz. When the process ends, it disables all the components except for the receivers, and the microprocessor returns to sleep mode.

In the event that the display device 14, 31 is located in a region away from the gun, an on and off protocol is also established to save energy. If the receiver

of the information to be displayed receives instructions from the central control unit, the micro-controller of the display device 14, 31 determines the component to be turned on and the information to be displayed. Thus, depending on the instructions, the light signal, the alphanumeric display or both are turned on and the visible or infrared spectrum is specified. The components that are not required remain off. When the display ends, all the components are turned off, except for the micro-controller and the receiver of the information to be displayed which remains in sleep mode.

The devices for the control of long light guns that incorporate display devices 14, 31 may include an ambient illumination sensor. This will provide a signal to the micro-controller, which will process it and will determine the necessary current to be supplied to the light device, to prevent it from always operating in a configuration of maximum emissivity, which serves to control the energy saving and reduce the battery consumption.

In a scenario where the original magazine mouthpiece of the gun is replaced by the adapter device 13, the central control unit required for the control of the gun is housed in the receptacle 23. The adapter device 13 comprises two actuation pushbuttons located on the sides of the adapter 13, near the gun trigger, to be able to request the display of information data by right-handed or left handed users. The central control unit is turned on and/or off by two relays actuated by an on/off actuation pushbutton.

It also incorporates actuation pushbuttons on the two sides that activate the request for information via two relays. The receptacle 23 houses accessories or elements thereof, e.g., a shot counter, a rate of fire detector device and a cartridge counter.

In a scenario in which the shot counter comprises piezoelectric type sensors or accelerometers, the adapter device 13 should be perfectly adjusted to the magazine mouthpiece to prevent false alarms. However, since not all long

light guns have the same type of mouthpiece because the shapes differ depending on the long gun, the adapter device 13 should be adapted to each type of mouthpiece on top of which it is placed. The dimensions of the adapter device 13 are modified by a series of mechanical wedges that enable the adapter device 13 to be mounted on a wide range of magazine mouthpieces.

For example, mechanical interface pieces are incorporated between the joints of the two parts that form the adapter 13 to increase the final perimeter of the adapter 13, maintaining the continuity of its external surface. These small pieces are adapted to the jointing system between the two parts of the adapter 13 and are secured without having to include an additional adjustment system.magazine mouthpiece on top of which the device will in principle be placed.

Likewise, the internal dimensions and shape of the hollow rectangular tube of the adapter device 13 depend on the external dimensions and shape of the magazine mouth piece on top of which the device will in principle be placed.

To solve the technical problem of the different finishes of the mouthpiece of the long light gun, the adapter 13 includes a dovetail type recess adapted to the type of finish of the end of the mouthpiece most distant from the gun, where jointing pieces are fitted between the distal end of the mouthpiece and the adapter 13, achieving the type of adjustment required.

If vibration sensors are used to count shots, these are located near the walls of the mouthpiece and in contact with the surface of the adapter 13. To increase the sensitivity of the vibration sensors, they are located to touch the interior walls of the dovetail recess.

CLAIMS

1.- An adapter device installable on a portable long firearm (11) which comprises a mouthpiece for a cartridge storage element (12), characterized in that the adapter device (13) assumes a hollow rectangular polyhedral shape, is open at its top and bottom, and comprises first mechanical means (21-1, 21-2) distributed on the short sides of the adapter device for mechanically assembling the adapter device externally on the mouthpiece of the firearm, and second mechanical means (44) distributed on the interior sides of the adapter device (13) to receive the cartridge storage element (12).

2.- The adapter device as per claim 1 characterized in that the adapter device (13) is structured to be externally placed on top of the mouthpiece of the cartridge storage element (12).

3. The adapter device as per claim 1 characterized in that the adapter device (13) is structured to be directly assembled on the frame of the portable long firearm (11) and to receive the cartridge storage element (12).

4.- The adapter device as per claim 3 characterized in that the adapter device (13) further comprises a closed hollow receptacle located on one of the short sides of the adapter device (13).

5.- The adapter device as per claim 4 characterized in that the closed hollow receptacle (23) is structured to insulate an accessory element that is inserted into the closed hollow receptacle (23) from the environment in which the firearm is used.

6.- The adapter device as per claim 5 characterized in that the closed hollow receptacle (23) is structured to be an impermeable compartment for the accessory element installed inside the closed hollow receptacle (23).

7.- The adapter device as per claim 5 characterized in that the closed hollow receptacle (23) is structured to store at least one component comprised of a central control unit that receives and generates data signals associated with the operation of the firearm, an input and output interface, a transmission and receiver unit to transmit and receive data signals via a wireless telecommunications system, an electric power supply source and a data storage unit.

8.- The adapter device as per claim 7 characterized in that the closed hollow receptacle (23) includes a shot counter.

9.- The adapter device as per claim 7 characterized in that the closed hollow receptacle (23) includes a counter of the number of cartridges in the cartridge storage element.

10.- The adapter device as per claim 7 characterized in that the transmission and receiver unit transmits and receives signals to and from remote accessories located remotely from the gun firearm.

11.- The adapter device as per claim 7 characterized in that the transmission and receiver unit transmits data signals to a display device (14, 31) where these data are displayed.

12.- The adapter device as per claim 11 characterized in that the display device (14, 31) is structured to be compatible with multiple supports comprised of standard complements of a the firearm.

13.- The adapter device as per claim 11 characterized in that the display device (14, 31) is structured to be adaptable to the physiognomy of the firearm without affecting the use of the firearm.

14.- A portable long firearm comprising a mouthpiece for a cartridge storage

element (12) characterized in that the portable long firearm further comprises the adapter device (13) of claim 1.