

FIREARM SIGHTING ASSEMBLY

Field of the Invention

5 This invention relates to a firearm sighting assembly and to a firearm having such an assembly which enables the firearm to be fired at a target around corners and from any particular angle the user may take up without the need to expose the user.

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Background of the Invention

In order to fire a firearm and hit a target, it is necessary to aim straight towards the target and fire a
15 bullet projectile to reach and damage the target. In many cases it would be desirable for the user of a firearm to hit a target whilst lying at an angle or, firing from around a corner or behind cover so that the user is not exposed to counter fire. With conventional
20 firearms this is impossible since the firearm barrel has a rigid sight aligned with the barrel that prevents the user from properly sighting a target with the rigid sight when lying on the ground or around corners.

25 Summary of the Invention

The object of the present invention is to overcome this problem.

30 The invention provides a sighting assembly for a firearm comprising:

an image acquisition device for acquiring an image of a target;

a first mounting for mounting the image acquisition
35 device so the device obtains an image of the target in the direction of an aiming sight of the firearm;

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a display for displaying the image captured by the image acquisition device; and

a second mounting for mounting the display so the display can be moved relative to the firearm to enable
5 an image of the target to be observed without the need to look down the line of the aiming sight of the firearm.

Since the invention includes the display and image
10 acquisition device which allows the target to be observed without looking down the aiming sight, the firearm including the sighting system can be used by a user observing the target by the display without the user having to expose himself to counter fire. This can
15 be achieved by pointing the firearm towards a target whilst angling the display so that the user can look at the display from an angle with respect to the axis of the firearm thereby enabling the user to remain behind cover whilst the firearm is aimed at the target and
20 fired.

Preferably the first mounting mounts the image acquisition device for movement between a position in which the image acquisition device occludes the aiming
25 sight of the firearm to a position in which the image acquisition device is moved away from the aiming sight so the user can aim the firearm by using the aiming sight only and looking down the axis of the firearm.

30 Preferably the second mounting for mounting the display comprises a vertical swivel mounting for enabling the display to be swivelled about a first axis generally perpendicular to the axis of the firearm and a horizontal swivel mounting for enabling the display to
35 be swivelled about a second axis generally perpendicular to the first axis.

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Preferably the vertical swivel mounting comprises a base pivotally mounted on the assembly and a pair of lugs, and the horizontal swivel mounting comprises a pair of lugs pivotally connected to the lugs of the horizontal swivel mounting to enable the horizontal swivel mounting to rotate relative to the vertical swivel mounting about the second axis.

10 Preferably the assembly includes an assembly plate, the image acquisition device being coupled to the plate, the first mounting mounting the plate and therefore the image acquisition device for movement between a position in which the image acquisition device occludes the aiming sight of the firearm and a stowed position, the second mounting being arranged on the plate for mounting the display.

20 Preferably the display comprises an LCD display.

In one embodiment the image acquisition device includes a CCD array. The CCD array may be in the form of a camera for capturing an electronic image and for supplying the electronic image to the display for display on the display.

In other embodiments the image acquisition device may include a night vision device.

30 Preferably the second mounting comprises a second swivel coupling for coupling the acquisition device relative to the aiming sight so the acquisition device can be pivoted from a position occluding the aiming sight to a position stowed away from the aiming sight.

35 Preferably the sighting assembly includes a fixture for

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fixing the sighting assembly to the firearm, the second mounting device being attached to the fixture, the vision acquisition device being coupled to the second mounting and the first mounting also being coupled to the second mounting so that both the vision acquisition device and display can be moved between the position where the vision acquisition device occludes the aiming sight and the stowed position, and the first mounting device enables the display to be moved relative to the second mounting device and the image acquisition device so the display can be arranged at a desired angle with respect to the image acquisition device and the firearm when the image acquisition device is in the position occluding the aiming sight.

Preferably a locking mechanism is provided for locking the first mounting in the position in which the image acquisition device occludes the aiming sight.

The invention also provides a sighting assembly for a firearm comprising:

- an image acquisition device for acquiring an image of a target;

- a first moveable mounting for mounting the image acquisition device so the device obtains an image of the target in the direction of an aiming sight of the firearm and for moving the image acquisition device between a position occluding the aiming sight to a position stowed away from the aiming sight; and

- a display for displaying the image captured by the image acquisition device.

Preferably the display is mounted to the assembly by a second mounting so the display can be moved relative to the firearm to enable an image of the target to be observed without the need to look down the line of the

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aiming sight of the firearm.

Preferably the first mounting comprises a swivel mounting.

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Preferably the second mounting for mounting the display comprises a vertical swivel mounting for enabling the display to be swivelled about a first axis generally perpendicular to the axis of the firearm and a

10 horizontal swivel mounting for enabling the display to be swivelled about a second axis generally perpendicular to the first axis.

Preferably the vertical swivel mounting comprises a base
15 pivotally mounted on the assembly and a pair of lugs, and the horizontal swivel mounting comprises a pair of lugs pivotally connected to the lugs of the horizontal swivel mounting to enable the horizontal swivel mounting to rotate relative to the vertical swivel mounting about
20 the second axis.

Preferably the assembly includes an assembly plate, the image acquisition device being coupled to the plate, the first mounting mounting the plate and therefore the
25 image acquisition device for movement between the position in which the image acquisition device occludes the aiming sight of the firearm and the stowed position, the second mounting being arranged on the plate for mounting the display.

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Preferably the display comprises an LCD display.

In one embodiment the image acquisition device includes a CCD array. The CCD array may be in the form of a
35 camera for capturing an electronic image and for supplying the electronic image to the display for

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display on the display.

In other embodiments the image acquisition device may include a night vision device.

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Preferably the second mounting comprises a second swivel coupling for coupling the acquisition device relative to the aiming sight so the acquisition device can be pivoted from a position occluding the aiming sight to a position stowed away from the aiming sight.

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Preferably the sighting assembly includes a fixture for fixing the sighting assembly to the firearm, the second mounting device being attached to the fixture, the vision acquisition device being coupled to the second mounting and the first mounting also being coupled to the second mounting so that both the vision acquisition device and display can be moved between the position where the vision acquisition device occludes the aiming sight and the stowed position, and the first mounting device enables the display to be moved relative to the second mounting device and the image acquisition device so the display can be arranged at a desired angle with respect to the image acquisition device and the firearm when the image acquisition device is in the position occluding the aiming sight.

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Preferably a locking mechanism is provided for locking the second mounting in the position in which the image acquisition device occludes the aiming.

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The invention also provides a firearm having a sighting system described above.

Preferably the firearm includes a sight mount for mounting the aiming sight of the firearm and the fixture

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mounts on the aiming sight.

Brief Description of the Drawings

5 A preferred embodiment of the invention will be described, by way of example, with reference to the accompanying drawings in which:

10 Figure 1 is an exploded view of a firearm sighting system according to the preferred embodiment of the invention;

Figure 2 is an assembled view of the system of Figure 1;

15 Figure 3 and Figure 4 are views similar to Figure 2 except from different perspectives to show additional detail;

20 Figure 5 is a view showing rotation axis for display using the preferred embodiment.

Figure 6 is a front view of the system of Figure 2;

Figure 7 shows the system fitted to a rifle;

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Figure 8 is a view showing the system in a stowed position; and

30 Figure 9 is a view showing the system in an in-use position.

Detailed Description of the Preferred Embodiment

35 With reference to Figures 1 to 6 a sighting assembly 10 is shown which comprises a fixture 12 for fixing the sighting assembly 10 to a firearm, a first mounting 16,

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a second mounting 14, and a display 18. The mountings 14 and 16 are arranged on a plate 20 which has an incline portion 22, a flat portion 24 and a rear portion 26. The inclined portion of the plate 20 mounts an
5 image acquisition device 30 which may be in the form of a CCD camera, night vision device or other imaging device which is able to convert a light image received by device 30 into electronic signals.

10 The bracket 22 has side plates 31 and a semi circular support 32 which engages with a support 33. A bolt can be provided through the supports 32 and 33 to hold the supports 32 and 33 together and therefore hold the image acquisition device 30 fixed in place relative to the
15 plate 22. The plates 31 also support a support 32a which facilitates support of the device 30.

The portion 24 of the plate 20 mounts a support plate 34 onto which is coupled a swivel bracket 36 which has a
20 bottom plate 37 and side lugs 38. A swivel 39 fixed in the plate 37 enables the bracket 36 to swivel or pivot relative to the portion 24. The lugs 38 mount a further bracket 40 which has a top 41 and side lugs 42. The side lugs 42 are pivotally connected to the lugs 38 by
25 pivot pins 43.

The top plate 41 has a plurality of studs 45 on which the LCD display 18 can mount. Alternatively the display 18 can be mounted in any other desirable fashion on the
30 upper plate 41.

As is best shown in Figure 5 the swivel 39 enables the brackets 36 and 40 to rotate or swivel about a vertical axis which is represented by the dotted line A' in
35 Figure 5. The pivot coupling of the bracket 40 to the bracket 36 enables the bracket 40 to pivot relative to

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the bracket 36 about a horizontal axis represented by dash line A'' in Figure 5. Thus, when the display 18 is mounted on the bracket 40 the display can be swivelled into any desired position for viewing relative to the longitudinal axis of a firearm (that is relative to the firing direction of the firearm).

The portion 26 of the plate 20 carries a locking lever 50 which is pivotally mounted between two blocks 51 fixed to the plate portion 26. The swivel mount 16 mounts to plate portion 26 pivotally onto the fixture 12 via mount bracket 54 which is bolted to top plate 55 of the fixture 12. The bracket 54 includes mounting portion 56 which has pivot hole 57 for receiving a pivot pin (not shown) to pivotally mount the plate portion 26 to the mounting portion 56. The bracket 54 also has an upstanding locking lug 58 having a notch 59 so that when the plate 26 is pivotally mounted onto the portion 56 and the locking lever 50 is in the position shown in Figure 1 the lever will engage the cut-out 59 to thereby lock the assembly 10 into the in use position where it will occlude the aiming sights of a rifle. The locking engagement is best seen in Figures 4 and 5.

The top plate 55 is provided with a downward extending plate portion 55a (best seen in Figure 3) and is hinged by a hinge pin 60 to support rings 61. The top plate 55 and the rings 61 define a generally circular opening 62 which enables the fixture 12 to be mounted on a rifle as will be described in more detail hereinafter.

The plate 55 also carries two L-shaped hooks 63 (best shown in Figures 2, 4 and 5) and the plate 61 carries two catches 64 which retains spring-loaded wire retainers 66 for engaging the hooks 63 to hold the plates 55 and 61 in a closed position.

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Figure 7 shows a rifle 80 carrying the sighting assembly 10. The rifle 80 has a conventional sight 81 which is mounted on a sight mount 82 fixed to the rifle 80. The
5 conventional sight 81 may be a telescopic sight or the like. The assembly 12 is fixed to the telescopic sight 81 by disengaging the wire retainers 66 from the hooks 63 and pivoting the plate 55 and rings 61 apart about pivot pin 60. The central hole 62 is therefore opened
10 and can fit over enlarged diameter portion 85 of the sight 81 as is best shown in Figure 8. The plate 55 and rings 61 are then closed and the wire retainers 66 re-engaged with the hooks 63 to fix the fixture 12 onto the rifle 80.

15 As shown in Figure 8 the assembly 10 is in the stowed position away from the sight 81. The assembly 10 is swivelled into the stowed position by disengaging the locking lever 50 from the plate 58 and cut-out 59 and
20 swivelling the plate 20 in the direction of arrow B in Figure 8 so the image acquisition device 30 and the display 18 are in side by side relationship with the sight 81.

25 When it is desired to use the sighting assembly 10 the plate 20 is rotated in the opposite direction to arrow B into the position shown in Figure 9. It should be noted that Figure 9 shows the assembly from the opposite side to that in Figure 8 and arrow C illustrates the firing
30 direction in Figures 8 and 9 for ease of relative identification. Rotation of the plate 20 into the position shown in Figure 9 aligns the image acquisition device 30 with the sight 81 so the sight is occluded by the image acquisition device 30. The assembly 10 is
35 locked into position by re-engaging the locking lever 50 with the plate 59. Thus, the image acquisition device

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30 is looking in exactly the same direction as the sight 81 and acquires an image of the target as would be acquired by a user if the user is looking through the aiming sight 81. The image acquired by the acquisition
5 device 30 is converted into an electronic signal which is supplied to the display 18 and is displayed on screen 18a (see Figure 9) of the display 18. Display 18 is pivoted into the desired position so the screen 18a can be seen by the user. The image acquisition device 30
10 may include a crosshair for sighting purposes or may take an image of the crosshair which is in the sight 81 for accurate sighting by the user via the display 18.

Thus, the user is able to aim the rifle without having
15 to expose himself and look through the aiming sight 81 in the direction of the rifle towards a target. Rather, the rifle can be pointed towards a target whilst the user remains undercover or around a corner or is lying on the ground at any particular angle and the rifle
20 aimed via the image which is displayed on the display 18a which can be pivoted or swivelled into a position in which the user can readily observe the screen 18a without exposing himself to counter or return fire.

25 The display 18 may display a moving video image so not only can it be used as an aiming device but also to observe a region without the user being exposed.

The amount of eye relief (i.e. the gap between the CCD
30 camera of the image acquisition device 30 and the firearms aiming sight 81) required as dependent on the optical characteristics of the image acquisition device 30.

35 Should it be necessary for the user to perform direct aiming without the assembly 10, the assembly 10 is swung

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to the stowed position shown in Figure 8. Thus, the device can be easily swung to the stowed position and quickly stowed simply by lifting the locking lever 50 and rotating the plate 20 so the user can quickly use the aiming sight 81 for direct aiming should that be necessary or desired.

The fixture 12 can be designed for different mounting configuration such as Piccadilly rail mounted or carry handle mounted.

The display 18 may be a convention LCD display which receives a video signal from the acquisition device 30 and may include an on/off switch, brightness and contrast controls and self-contained power supply (not shown). The power supply can also be used to operate the image acquisition device 30.

Since modifications within the spirit and scope of the invention may readily be effected by persons skilled within the art, it is to be understood that this invention is not limited to the particular embodiment described by way of example hereinabove.

In the claims which follow and in the preceding description of the invention, except where the context requires otherwise due to express language or necessary implication, the word "comprise" or variations such as "comprises" or "comprising" is used in an inclusive sense, i.e. to specify the presence of the stated features but not to preclude the presence or addition of further features in various embodiments of the invention.

Claims

1. (amended) A sighting assembly for a firearm comprising:
an image acquisition device for acquiring an
5 image of a target;
a first mounting for mounting the image
acquisition device on the firearm so when so mounted, the
acquisition device is supported by the firearm, and so the
device obtains an image of the target in the direction of
10 an aiming sight of the firearm;
a display for displaying the image captured by
the image acquisition device; and
a second mounting supported by the first mounting
for mounting the display on the firearm so when so
15 mounted, the display is supported by the firearm, so the
display can be moved relative to the firearm to enable an
image of the target to be observed without the need to
look down the line of the aiming sight of the firearm.
- 20 2. The assembly of claim 1, wherein the first
mounting mounts the image acquisition device for movement
between a position in which the image acquisition device
occludes the aiming sight of the firearm to a position in
which the image acquisition device is moved away from the
25 aiming sight so the user can aim the firearm by using the
aiming sight only and looking down the axis of the
firearm.
3. The assembly of claim 2, wherein the second
30 mounting for mounting the display comprises a vertical
swivel mounting for enabling the display to be swivelled
about a first axis generally perpendicular to the axis of
the firearm and a horizontal swivel mounting for enabling
the display to be swivelled about a second axis generally
35 perpendicular to the first axis.
4. The assembly of claim 3, wherein the vertical

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swivel mounting comprises a base pivotally mounted on the assembly and a pair of lugs, and the horizontal swivel mounting comprises a pair of lugs pivotally connected to the lugs of the horizontal swivel mounting to enable the horizontal swivel mounting to rotate relative to the vertical swivel mounting about the second axis.

5. The assembly of claim 1, wherein the assembly includes an assembly plate, the image acquisition device being coupled to the plate, the first mounting mounting the plate and therefore the image acquisition device for movement between a position in which the image acquisition device occludes the aiming sight of the firearm and a stowed position, the second mounting being arranged on the plate for mounting the display.

6. The assembly of claim 1, wherein the display comprises an LCD display.

7. The assembly of claim 1, wherein the image acquisition device includes a CCD array.

8. The assembly of claim 1, wherein the image acquisition device comprises a night vision device.

9. The assembly of claim 1, wherein the second mounting comprises a second swivel coupling for coupling the acquisition device relative to the aiming sight so the acquisition device can be pivoted from a position occluding the aiming sight to a position stowed away from the aiming sight.

10. The assembly of claim 1, wherein the sighting assembly includes a fixture for fixing the sighting assembly to the firearm, the second mounting device being attached to the fixture, the image acquisition device being coupled to the second mounting and the first

mounting also being coupled to the second mounting so that both the vision acquisition device and display can be moved between the position where the image acquisition device occludes the aiming sight and the stowed position,
5 and the first mounting device enables the display to be moved relative to the second mounting device and the image acquisition device so the display can be arranged at a desired angle with respect to the image acquisition device and the firearm when the image acquisition device is in
10 the position occluding the aiming sight.

11. The assembly of claim 10, wherein a locking mechanism is provided for locking the first mounting in the position in which the image acquisition device
15 occludes the aiming sight.

12. A firearm having a sighting assembly according to claim 1.

20 13. The firearm of claim 12 further comprises a sight mount for mounting an aiming sight of the firearm and the assembly having a fixture for mounting on the aiming sight.

25 14. A sighting assembly for a firearm comprising:
an image acquisition device for acquiring an image of a target;
a first mounting for mounting the image acquisition device so the device obtains an image of the
30 target in the direction of an aiming sight of the firearm;
a display for displaying the image captured by the image acquisition device;
a second mounting for mounting the display so the display can be moved relative to the firearm to enable an
35 image of the target to be observed without the need to look down the line of the aiming sight of the firearm;
wherein the first mounting mounts the image

acquisition device for movement between a position in which the image acquisition device occludes the aiming sight of the firearm to a position in which the image acquisition device is moved away from the aiming sight so
5 the user can aim the firearm by using the aiming sight only and looking down the axis of the firearm.

15. The assembly of claim 14, wherein the sighting assembly includes a fixture for fixing the sighting
10 assembly to the firearm, the second mounting device being attached to the fixture, the image acquisition device being coupled to the second mounting and the first mounting also being coupled to the second mounting so that both the image acquisition device and display can be moved
15 between the position where the image acquisition device occludes the aiming sight and the stowed position, and the first mounting device enables the display to be moved relative to the second mounting device and the image acquisition device so the display can be arranged at a
20 desired angle with respect to the image acquisition device and the firearm when the image acquisition device is in the position occluding the aiming sight.

16. The assembly of claim 15, wherein a locking
25 mechanism is provided for locking the first mounting in the position in which the image acquisition device occludes the aiming sight.