

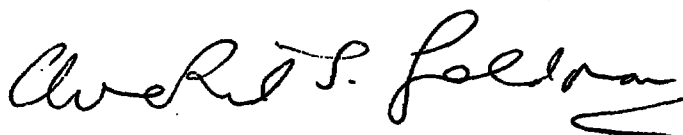
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CERTIFICATION

I, Averil Susan Goldman, of 9 Park Square, Leeds LS1 2LH, West Yorkshire, England, hereby certify that I am well acquainted with the English and German languages and that to the best of my knowledge and belief the following is a true translation, made by me, of the original text of the specification of European patent (UK) no. 0125429.

Signed:



Dated: this fourth day of May 1989

The invention relates to an optical system for a sighting device like a periscope for tracking, ranging and surveying a target, having a laser range finder comprising a transmitter and a receiver.

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The aim underlying the invention is to design as simply and as economically as possible the construction of an optical system for a sighting device of the type mentioned earlier, omitting an erecting prism, and integrating a laser range finder whilst maintaining a high degree of measurement accuracy.

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According to the invention this aim is achieved by the arrangement, defined in the characterising part of claim 1, of the essential optical components.

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Further features of the invention can be seen from the following description in conjunction with the drawing and the claims.

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The invention is described below in detail by means of an embodiment example with reference to the drawings.

They show:

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Fig. 1 a schematically represented sighting device with the optical system arranged in a housing, and Fig. 2 the optical system of Fig. 1 shown on a larger scale in perspective.

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In Fig. 1 the reference numeral 100 designates a schematically shown sighting device which essentially comprises a housing 95, an optical system 90 arranged therein as well as a laser range finder 60 only partially represented in Fig. 1. The optical system 90 shown in Fig. 1 and Fig. 2 and comprising the beams or the optical axes A1, A2, A3, A4 and A5 is constructed

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as a first functional unit and the laser range finder 60 comprising the beams L1, L2, L3, L4 and L5 is constructed as a second functional unit.

5 The optical system 90 shown in Fig. 2 in perspective and on an enlarged scale comprises, as seen in the direction of the optical radiation or axes A1 to A5, essentially a main mirror 50, a first deflection prism 45, a first objective lens 40, a first beam splitter 10 35, a second beam splitter 30, a second deflection prism 25, a graduated dial 15 and an eyepiece 10 which offers the eye 5 of an observer a view into the sighting device 100.

15 Also seen in Fig. 2, seen in the direction of the radiation L1 to L5, is the laser range finder 60, essentially provided with a laser transmitter 57 and a deflection prism 56, with which a deflection mirror 55 is correspondingly associated. In the direction of 20 radiation A3, a laser receiver portion 75' which essentially comprises two optical elements 65 and 70 as well as the actual receiver 75, is arranged in spaced relationship to the deflection mirror 55 in the region of the first beam splitter 35. The element 65 here is 25 a lens and the element 70 is a lens system constructed as an aperture diaphragm.

Seen in the direction of radiation A5, a first laser blocking filter 20 is arranged between the second 30 deflection prism 25 and the eyepiece 10. In order to achieve image control and/or target tracking, a TV camera 85 can be arranged laterally on the housing 95. An aperture 95' (Fig. 1) provided in the housing 95 for the connection of the TV camera 85 is closed off with a 35 cover plate, which is not shown in detail, if a TV

camera is not installed. In the region of the aperture 95' there is further arranged a second laser blocking filter 80. The two laser blocking filters 20 and 80 are used to absorb residual laser beams.

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The parts 50, 45, 40, 35, 30, 25 and 80 associated with the optical system 90, as well as the parts 65, 70 and 75 associated with the laser range finder 60 are, as shown in Fig. 1, arranged in the housing 95 of the sighting device 100 and are retained by means which are not shown. A holding device (not shown) for the eyepiece 10 and the blocking filter 20 as well as the actual laser range finder 60 are arranged on the rear side of the housing 95.

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According to Fig. 1 the main mirror 50 is pivotably mounted in a schematically shown bearing body 51 about an elevational axis X in the direction of the arrow X', and the bearing body 51 together with the main mirror 50 is rotatable about an axis Y in the direction of the arrow Y'. To monitor the rotary movement orientated in the direction of the arrow Y' there is provided a first code disk 52, and to monitor the pivoting movement orientated in the direction of arrow X' there is provided a second code disk 52'. The main mirror 50 is provided with a surface-coated reflecting glass plate which is not shown or referenced in detail.

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The first deflection prism 45 appropriately associated with the main mirror 50 is constructed for a beam deflection of 90° and has an aperture diaphragm 46 on the lower side facing the main mirror 50. The aperture diaphragm 46 secured on the deflection prism 45 by means which are not shown is used to limit the diameter of the radiation in the visual range.

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The objective lens 40 arranged between the first deflection prism 45 and the first beam splitter 35 is constructed as a two-lens achromatic system.

5 The first beam splitter 35 is used to reflect the laser radiation which is conducted through the first lens 65 and the lens system 70 to the receiver 75. The parts 65 and 70 are used for the afocal transmission of the infra-red beams into the receiver 75.

10 The second beam splitter 30 is used to deflect the visual radiation to the second deflection prism 25, provided with a rear surface-mirror coating, which directs the radiation in the direction of the optical
15 or ocular (eyepiece) axis A5.

The eyepiece 10 is used for the observation and enlargement of the image together with the graduated dial image and the graduated dial 15.

20 The beam-splitting which can be achieved with the second beam splitter 30 makes possible the use of the already mentioned TV camera 85 in addition to visual observation by means of the eyepiece 10.

25 The method of operation of the sighting device 100 with the optical system 90 of the invention is described below in detail:

First of all the orientation process takes place by
30 means of the sighting device 100 and in this process, for example, a weapon (not shown), upon which the sighting device 100 is mounted, is orientated at an object according to its height and its lateral displacement. The image of the object arrives at the
35 main mirror 50 as radiation A1, is reflected,

independent of the angular position of the main mirror 50, as a radiation A2 limited by the aperture diaphragm, onto the first deflection prism 45, is deflected by the latter by an angle of 90° and is transmitted as radiation A3 through the objective lens 40 and the first beam splitter 35 to the second beam splitter 30, and from there as radiation A4 to the second deflection prism 25. From the second deflection prism 25 the radiation A5 is conducted through the first blocking filter 20 to the eyepiece 10 and hence to the eye 5 of the observer.

During additional surveying by means of the laser range finder 60 the beam L1 transmitted by the laser transmitter 57 is conducted by the deflection prism 56 as a beam L2 through an aperture (not shown) of the housing 95 to the deflection mirror 55, from there coaxially to the optical radiation A2 as a beam L3 to the main mirror 50, and from there as a beam L4 to the object. The laser beam reflected from the object and not shown or referenced in more detail again strikes the main mirror 50 and travels parallel to the optical beams as a substantially common beam of radiation A1, A2 and A3 to the first beam splitter 35. The laser radiation is reflected by the first beam splitter 35 and conducted as a beam L5 through the first lens 65 and the lens system 70 to the receiver 75.



Claims

1. Optical system (90) for a sighting device (100) for ranging and surveying a target, having a laser transmitter (57) and receiver (75), which form a range finder with a part of the optical system, characterised in that following optical components are arranged in the direction of a beam (A1) incident into the sighting device: a main mirror (50) pivotable round a first axis (Y) and round a second axis (X), an aperture diaphragm (46), a first deflection prism (45), an objective lens (40), a first beam splitter (35), a second beam splitter (30) in a first beam portion of the first beam splitter, a second deflection prism (25) and an eyepiece (10) in a second beam portion of the second beam splitter, and the laser receiver (75) in the second beam portion of the first beam splitter, and in that the laser transmitter (57) is so arranged with respect to the main mirror (5) of the optical system (90) that at least one portion (L3) of the beam path of the beam (L1) emerging from the transmitter strikes the main mirror, missing the aperture diaphragm (46), substantially parallel to the incident light beam (A2) deflected from the main mirror, so that there is a laser beam (L4) emerging substantially parallel to the incident beam (A1).

2. Optical system according to claim 1, characterised in that a TV camera is arranged in the first beam portion of the second beam splitter (30).

3. Optical system according to one of claims 1 or 2, characterised in that in the beam path (L1, L2, L3, L4) of the laser beam from the laser transmitter (57), a deflection mirror (55) is arranged in front of the main mirror (50).