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| (73) | Innehaver | Rheinmetall Waffe Munition GmbH, Heinrich-Ehrhardt-Straße 2, 29345 Südheide, Tyskland |
| (72) | Oppfinner | JUNG, Markus, Am Hirtenhaus 5, 29358 Eicklingen Niedersachsen, Tyskland<br>LUDEWIGT, Klaus, Am Langberg 117D, 21033 Hamburg, Tyskland |
| (74) | Fullmektig | ZACCO NORWAY AS, Postboks 488, 0213 OSLO, Norge |

(54) Benevnelse **WEAPONS SYSTEM HAVING AT LEAST TWO HEL EFFECTORS**

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## DESCRIPTION

The invention relates to a weapon system consisting of at least two high-energy laser (HEL) effectors. The invention relates to the system setup of a weapon system having several, but at least two, HEL effectors on an object, in particular with regard to the aspects of system weight, volume, integration concept and installation effort.

HEL effectors are used inter alia to protect movable or stationary objects. An HEL effector is used to combat different targets. Multiple HEL effectors can be simultaneously aligned to a target or to multiple targets. These can include static targets, such as mines, IEDs (improvised explosive devices), etc., but also dynamic targets, such as rockets, artillery shells or RAM projectiles, etc. These targets are then blown up and/or destroyed as part of countering the threat. In particular, small targets (low, slow & small = LSS targets) can be easily destroyed or blown up by such a weapon system. LSS targets also include so-called UAVs (unmanned air vehicles), such as drones, which are frequently incorrectly used to transport explosives.

The key components of an HEL effector include a laser source and a beam guide system. The sub-assemblies - fine imaging systems (FIS), fine tracking systems (FTS), telescope and, if necessary, at least one adaptive optics (AO) - may be accommodated in the beam guide system. Known laser sources are gas lasers, such as $CO_2$ lasers, as well as solid-state lasers, such as diode lasers, fiber lasers, etc.

Currently, the advantages of fiber lasers, a specific form of the diode-pumped solid-state laser make them the preferred laser sources for HEL effectors. The high-performance fiber laser comprises one or more pump sources, such as, for example, one or more pump diode(s). In the fiber laser, the pump light is coupled into an active fiber and converted into laser light with a very good beam quality. High-performance fiber lasers are either designed as pure oscillators (an active fiber with a resonator) or as multi-stage oscillator amplifier systems, so-called MOPAs (master oscillator and power amplifiers). In the MOPA setup, the power of an oscillator is coupled into subsequent amplifier stages (active fibers) and amplified to a higher power. The laser light is then emitted via the beam guide system to a target, etc. for combating the target. All optical components are generally connected to optical fibers (passive transport fibers). In addition, the power supply and cooling system, which supplies power to and cools the pump source and master oscillator power amplifier of the individual laser sources. The power supply and cooling system can be a component of the laser source.

Due to non-linear processes, which can occur in fibers at high power, the lengths of the transport fibers, for example between the MOPA or oscillator and the beam guide system, must be limited at high powers in the multi-kW range. Depending on power, fiber parameters, fiber structure, wavelength or the like, a maximum possible fiber length of a few meters can result.

In addition, the beam quality M2 is a decisive factor for the effect of HEL effectors. The beam quality value M2 should be as small as possible, preferably less than 2.

HEL effectors, like other weapon systems, can be mounted on a fixed or movable platform. In this respect, weapon stations are also referred to as platforms. These platforms can in turn be attached to stationary objects (e. g., houses, bunkers, containers, etc.) or movable objects (e.g., vehicles on land, in the air and on the sea, containers, etc.). Multiple platforms are often used in larger objects. On a vehicle, in particular on a maritime object, such as a ship, the platforms are frequently arranged on the starboard side and/or port side. Further platforms can additionally or alternatively be mounted on the stern and/or on the bow.

The advantage of an HEL effector over conventional effectors (conventional weapons) is inter alia a high hit accuracy and instantaneous action. A rate action does not have to be taken into account. There are also no muzzle flashes and almost no firing signatures. Also, the usability of the HEL effector is not limited by a magazine supply.

To realize the required beam quality of an HEL effector, it is desirable to also accommodate the MOPA or the oscillator very close to the weapon station or platform.

In practice, the components of the HEL effector are accommodated in a compartment (room). This leads to a limitation in terms of the setup locations and the achievable maximum laser power. Such a limitation has a negative impact, particularly on maritime objects.

A laser system for generating high or compact power densities on the object is known from DE 10 2010 051 097 A1. The power is divided over multiple lasers or laser weapons and they are geometrically superimposed on the target so that an overall power density of all individual power densities is achieved in total at the target. As a weapon, the individual lasers or laser weapons form a weapon system for combating an attacking object. These laser weapons are aligned with the object using coarse and fine tracking. The laser weapons may be mounted on a moving or stationary platform. According to the document, such lasers can also be used as machining lasers for material processing, at a greater distance for example.

WO 2006/103655 A2 describes a laser or a laser weapon, in which a laser generating unit is spatially separated from a telescope to be directed onto the target. While the telescope is located along with a target recognition or target tracking on a movable platform of a mobile vehicle, the laser generating unit is permanently integrated in the mobile vehicle or in a separate unit. The functional connection between the telescope and the laser generation unit is produced by an optical fiber.

DE 33 18 686 A1 discloses a device for aligning a laser beam. This device is designed to be able to pivot a high-energy laser beam in a fixed parallel orientation to orient further devices located on a platform. The laser source is arranged away from the platform. The laser beam is transmitted to optical elements via deflecting mirrors.

DE 10 2012 015 074 B3 discloses a beam director unit for a laser weapon system, wherein the beam director unit has a stationary/partially movable part and a fully movable part. A target recognition or target tracking and a telescope and an output stage element are attached to the fully movable portion. The beam director unit comprises at least one laser generating unit having at least one seed laser unit and at least one pump laser unit. The seed laser unit and the pump laser unit are connected to the output stage element (e.g., amplifier) using an optical fiber in each case. In the case of multiple pump laser units, the individual laser powers are combined in a beam coupler and likewise fed via an optical fiber to the output stage element. It is thereby achieved that the mass on the fully movable part can be reduced. The total weight on the object does not change, however.

DE 10 2012 022 039 A1 discloses a laser irradiation unit for irradiating a target object with high laser radiation, comprising multiple laser beam modules which are rigidly connected to one another and which are designed to emit laser radiation. A director unit serves to align the laser beam modules on the target object. Each of the laser beam modules comprises an optical unit which is designed to align laser radiation on a target point of the target object. The laser power required in each case makes it easy to adapt by the number of laser beam modules. The laser light for the high-power laser beam modules and the target marking laser beam module is generated in a laser module that receives a plurality of fiber conductors connected to the beam modules. It is provided that the laser illumination unit comprises multiple laser sources which are designed to generate laser radiation and which are each connected by an optical fiber to a laser beam module. The director unit can move the laser beam modules independently of the laser source. US 5,208,699 discloses a laser system having a central laser source for generating laser radiation, wherein an oscillator and an amplifier are provided centrally for amplifying the laser radiation at the central laser source. The object of the invention is to optimize the system setup with regard to the required mass, space requirement and integration effort, when using two or more HEL effectors.

The object is achieved by the features of claim 1. Advantageous embodiments are shown in the dependent claims.

The invention is based on the idea of not assigning all the key components of an HEL effector to each HEL effector. Thus, not every HEL effector should have a complete intrinsic laser source or parts thereof, for example. Instead, it is provided that this key component, or parts thereof, is jointly usable by multiple HEL effectors. This key component, or parts thereof, is defined as a jointly usable component. In an optimal embodiment, an HEL effector only needs to have one intrinsic key component, i.e., at least one beam guide system as an individual component. The sub-assemblies - fine imaging systems (FIS), fine tracking systems (FTS), telescope and, if necessary, at least one adaptive optics (AO) - may be accommodated in the individual beam guide systems. The jointly usable key component, or parts thereof, is in turn connected to the individual key component(s) of the HEL effector in such a way that the functioning of at least one HEL effector is ensured.

The present invention therefore proposes that, in the case of a weapon system having at least two HEL effectors which have at least one beam guide system, only one laser source or one pump source for example be used for the at least two HEL effectors. The beam guide systems of the HEL effectors access the joint laser source or common pump source. The common laser source or the common pump source is optically linked with the beam guides, directly or indirectly, by means of at least one optical switching unit, so that at least one functional, complete HEL effector is provided in the weapon system for defending against threats.

The consequence of this concept is that individual key components or parts thereof can be saved where there is multiple HEL effectors on an object. Saving individual key components, or parts thereof, means that the total weight, the space requirement and the integration effort of the HEL effectors on the object can be reduced.

This concept is based on the knowledge that the accuracy, precision and rapid alignment of today's HEL effectors means that it is possible to combat a target or even multiple targets using just a single HEL effector. There is no need for all HEL effectors attached to the object to be operational at the same time.

In a first technically feasible embodiment, multiple, at least two, HEL effectors consist of a jointly usable key component, the laser source, and an individual key component, the intrinsic beam guide system. In this case, the laser source comprises at least one pump source having at least one, preferably multiple, pump diodes and at least one master oscillator and power amplifier (MOPA), alternatively at least one oscillator. An energy supply and cooling system can also be assigned to the laser source.

The central laser source forms the key component of all HEL effectors. The optical connections are realized by means of optical fibers or a free beam. The laser source, which can be used by multiple HEL effectors, can in turn be placed centrally on the object. It should be noted that a necessary beam quality is maintained during beam transport. The central laser source is optically linked with the individual beam guide systems via at least one optical switching unit. The optical switching unit can be an optical switch or an optical switching device. An optical switching device is characterized in that it switches quickly, at precise angles and always reliably. Furthermore, the optical switching unit should be designed to be able to divide the laser light into at least two outputs of the optical switching unit, also simultaneously. The division should be feasible continuously or in multiple stages. At least two stages are to be provided, for example via end stops. The laser light should be able to be divided from 0 to 100%.

The individual HEL effector thus consists in a first embodiment of a jointly usable laser source and at least one intrinsic beam guide system. This makes it possible for only the individual beam guide system of the respective HEL effector to have to be mounted on a platform, as already defined. Although this possible embodiment is not favored, it is technically feasible.

In a further preferred embodiment, the entire laser source, i.e., with all components, such as pump source, MOPA or oscillator, optionally power supply and cooling system, is not arranged centrally. It may be sufficient for only the pump source(s) of the laser source to be centralized. In addition to the intrinsic beam guide system, each HEL effector is assigned a separate master oscillator + amplifier (MOPA) or oscillator. This MOPA or oscillator can then be mounted in the vicinity of, also in direct proximity to, the respective platform, but also on the respective platform. Each amplifier of the MOPA or each oscillator can be optically connected to the pump source. The master oscillator (MO) can, as a function of the fiber length, be accommodated in the region of the pump source or of the amplifier. Further amplifiers can also be integrated in front of the individual beam guide systems of the HEL effectors.

The optical switching unit in turn serves to divide the pump power of the pump source into at least two outputs of the optical switching unit. Where there is multiple pump sources, these can likewise be distributed via the optical switching unit to at least two outputs of the optical switching unit. The outputs of the optical switching unit(s) for the pump power are in turn connected to at least one input of the amplifiers (PA) of the HEL effectors, preferably by means of optical fibers. The division of the pump power should be feasible continuously or in multiple stages. At least two stages are to be provided, for example via end stops. The pump power should be able to be divided from 0 to 100%. Furthermore, it is provided that the division at multiple outputs of the optical switching unit is possible simultaneously. A simultaneous division of the pump power into the amplifiers (PA) of the HEL effectors enables multiple HEL effectors to be be made to work simultaneously.

Alternatively, each pump source can be guided to an intrinsic optical switching unit and divided by the latter into at least two outputs. Furthermore, a cascade-like arrangement of $2^n$ outputs can be realized with the aid of multiple optical switching units having at least two outputs.

In this second embodiment, the individual HEL effector consists of a jointly usable central pump source, as well as at least one separate MOPA or at least one separate oscillator and at least one intrinsic beam guide system. The respective MOPA or the respective oscillator of the HEL effectors can be accommodated in the vicinity of the beam guide system of the HEL effector. A direct connection to the platform together with the beam guide system is also conceivable.

The optical connection between the pump source and the amplifiers of the MOPA or the oscillators is preferably effected via optical fibers. A free beam variant is also possible.

The optical linking of the central pump source to the oscillators or the amplifiers of the MOPA also takes place here via at least one optical switching unit. Here, the optical switching unit can likewise be an optical switch or an optical switching device. In this embodiment, the optical switching unit can cause, for example, a line of action to result: pump unit - fiber (optical path) - optical switching unit - fiber (optical path) - oscillator or amplifier. When multiple oscillators are used, the outputs of the optical switching unit(s) are connected to a pump input (active medium) of the oscillator, preferably by means of optical fibers. Thus, even when the beam quality of the pump diodes is low, in spite of the high power, an optical connection (fiber, free beam) can be realized between the at least one optical switch and the amplifiers or oscillators with a distance significantly greater than a few meters. However, variations in which an optical path is missing, however, are also conceivable in this embodiment.

Instead of the many individual master oscillators, another possibility is to provide a jointly usable master oscillator (MO) separately from the pump source. The optical connections between the pump source and the amplifiers of the HEL effectors take place according to the second embodiment. The provided central master oscillator can be located in the vicinity of the pump source, which simplifies the energy supply and cooling of the master oscillator. The output of the master oscillator can be connected via at least one further optical switching unit to at least one input of the amplifiers (PA) of the HEL effectors.

The low weight of the individual amplifier means that it can be mounted with the beam guide system directly on the platform. This enables a good beam quality of the amplifier to be couple at high power into the beam guide system. Depending on the output power of the master oscillator, different permissible fiber lengths result for the optical connection, e.g., optical fiber, between the master oscillator and the amplifiers.

In this third, likewise favored execution, the individual HEL effector consists of a jointly usable central pump source, a common master oscillator (MO), intrinsic amplifiers (PA) and intrinsic beam guide systems.

By means of an additional control, it is also possible to define which of the MOPA, amplifiers (PA) or oscillator(s) are to be supplied with what percentage of laser or pump power. In this way, the beam power of the laser or pump source can be adjusted and/or varied for each HEL effector. This percentage can be controlled by means of the optical switching unit(s).

The optical switching units can in turn be spaced apart from the central laser source or the central pump source and optionally from the central master oscillator (MO). The low beam quality of the pump diodes means that an optical connection (fiber, free beam) can be realized here in particular between the optical switch units and the amplifiers or oscillators with a distance significantly greater than a few meters. With poorer beam quality, the beam transport into fibers having a larger core diameter takes place at reduced intensity, so that non-linear processes deploy in a reduced manner.

The laser source or the pump source can also be separated from the other components of the HEL effectors via the optical switching unit. The HEL effectors can be transferred to a safety state via the optical switching unit(s).

Of course, further central laser sources, pump sources and further central master oscillators, etc. can also be provided as jointly usable key components. This allows a redundant system to be created. Multiple HEL effectors can also be combined into groups which can then be operated in parallel.

The use of a laser source, alternatively a pump source, etc., for multiple HEL effectors allows the total weight on the object to be reduced. The decentralized arrangement of the common central laser source or pump source, etc. for the multiple HEL effectors also provides the possibility of accommodating them on or in the object protected against environmental influences.

In addition to the weight saving, a further advantage is achieved by the present invention. The laser source, pump source, optionally the central master oscillator power amplifier (MOPA) or the central master oscillator (MO) or central oscillator can now preferably be accommodated within the object, e.g., in the hull of a ship or vehicle. These components are no longer subject to the environmental requirements on the object. A local separation also provides a further advantage. Thus, the individual components can be installed in smaller spaces on the object, for example in niches.

The saving of components is a huge advantage, especially on a ship. Such a paring down of components makes the use of HEL effectors on such objects possible and also financially viable. The HEL effectors can be offered more cost-effectively. Existing platforms, such as those of conventional effectors, can also be used. Thus, for example, the platform of a light naval gun, etc., can serve to accommodate individual components of the HEL effectors. But these advantages also result for other vehicles on land, in the water and in the air and can be transferred to further objects.

The mode of operation is generalized as follows:

If a target or a threat is detected, a weapon deployment system, for example, determines which of the beam guide system(s) of the HEL effectors located on the object can ensure the best possible defense against or neutralization of the threat as quickly as possible. Such methods are known to the person skilled in the art. The weapon deployment system then decides which beam guide system(s) are used. Alternatively, this can also be decided by an operator. This decision results in the selected beam guide system(s) being optically linked, as already described. The switching of the optical switching unit(s) can take place pneumatically, hydraulically, and also electrically or electro-optically, wherein other possibilities are not ruled out. The switching is controlled by the central control unit.

The invention will be explained in more detail with reference to an exemplary embodiment with a drawing. In the figures:

Fig. 1 shows a first embodiment in a schematic block diagram, wherein a laser source is usable for at least two or more HEL effectors,

Fig. 2 shows a second embodiment in a schematic block diagram, wherein at least one pump source can be used for at least two or more HEL effectors,

Fig. 3 shows a third embodiment similar to Fig. 2,

Fig. 4 shows a further embodiment of the inventive idea in a schematic block diagram

Fig. 5 shows a sketch of a cascade structure for a division of the laser power.

Fig. 1 shows a laser source 1 and at least two beam guide systems 2.1, 2.2, 3.3 as key components of multiple, at least two, HEL effectors 5.1, 5.2, 5.3.

An imaging system is defined as the beam guide system 2.1, 2.2, 2.3. This can be constructed according to DE 10 2010 051 097 A1. Beam guide systems having a different design are also conceivable. The laser source 1 includes at least one pump source 10, which is formed by at least one pump diode. The pump source 10 can be supplied with power and cooled by a power supply and cooling system 11. This power supply and cooling system 11 can be a component of the laser source 1. A master oscillator power amplifier (MOPA) 12 (e.g., seed laser + amplifier), which can be placed therein, is associated with the laser source 1. Alternatively, an oscillator (single resonator) 13 can also be used.

The individual beam guide systems 2.1, 2.2, 3.3 of the HEL effectors 5.1, 5.2, 5.3 can be connected to the laser source 1 via an optical switching unit 4. The HEL effectors 5.1, 5.2, 5.3 thus have a common laser source 1 and individual beam guide systems 2.1, 2.2, 2.3 as their key components.

The optical switching unit 4 can be an optical switch or an optical switching device. The optical switching unit has at least one input and at least two outputs. The optical switching unit 4 should be designed to be able to divide the laser power (optical power) generated in the laser source 1 for the beam guides 2.1, 2.2, 3.3 of the HEL effectors 5.1, 5.2, 5.3. The division can take place continuously or in several stages. The optical power can be divided between 0 to 100%. Furthermore, it is provided that a division of the optical power is possible simultaneously, so that multiple beam guides 2.1, 2.2, 3.3 can be supplied with optical power simultaneously by the optical switching unit 4. If the optical switching unit 4 has only two outputs, for example, a cascade can be constructed with the aid of multiple optical switching units 4, via which a division of the laser power into the beam guides 2.1, 2.2, 2.3 can be realized (Fig. 5).

The output of the laser source 1 is optically (15) connected to an input of the optical switching unit 4, ideally by an optical fiber. A freewheel is also possible.

The multiple outputs of the optical switching unit 4 are guided to inputs of the beam guide systems 2.1, 2.2, 3.3 via optical connections 15. The switching of the optical switching unit 4 is controlled by an additional controller 6

The beam guide systems 2.1, 2.2, 3.3 can in turn be mounted on a platform 7, 8, 9. The platforms 7, 8, 9 are in turn preferably movable so that the beam guide systems 2.1, 2.2, 3.3 of the HEL effectors 5.1, 2.2, 5.3 can be pivoted in azimuth and/or elevation. This makes it possible to direct the HEL effectors 5.1, 5.2, 5.3 to the threat (s).

In a first embodiment, the HEL effectors 5.1, 5.2, 5.3 are formed by the common central laser source 1, the optical switching unit 4, the intrinsic beam guide systems 2.1, 2.2, 2.3 and the optical connections 15, ideally optical fibers.

Multiple HEL effectors 5.1, 5.2, 5.3 can be combined to form a weapon system 100.

The mode of operation is as follows:

After the conventional detection of a threat or threats, etc., a weapon deployment system, e.g., a fire control unit (not shown in more detail) defines which beam guide system 2.1, 2.2, 2.3 would achieve a good defense against the threat. In the event that the beam guide system 2.1 of the HEL effector 5.1 is designated, this information is provided to the controller 6. In turn, the latter switches the optical switching unit 4 such that the optical power of the laser source 1 is transmitted via the switched output of the optical switching unit 4 and the input of the selected beam guide system 2.1. This beam guide system 2.1 emits the optical power against the threat.

In this case, the optical power of the laser source 1 to the beam guide system 2.1 can also be throttled (less 100%) by the optical switching unit 4. Should the fire control unit determine that more than one beam guide system 2.1, 2.2, 2.3 is needed for defense, the optical power of the laser source 1 is divided and this divided optical power is guided to the inputs of the beam guide systems 2.1, 2.2, 3.3 designated or identified for the defense. The optical power can then be emitted therefrom against the threat to counter it. In this case, the beam guide systems 2.1, 2.2, 3.3 can be directed to a threat together, as well as to different threats separately.

Fig. 2 and Fig. 3 show a variant of the solution according to Fig. 1 as a second exemplary embodiment. In contrast to the solution according to Fig. 1, the MOPP 12 or oscillator 13 is detached from the laser source 1 in the second exemplary embodiment. A central pump source 10 is provided, which generates the required pump power for all HEL effectors 5.1, 5.2, 5.3.

According to Fig. 2, multiple oscillators 21.1, 21.2, 21.3 is provided for the HEL effectors 5.1, 5.2, 5.3 instead of a central oscillator 13. An output of the respective oscillator 21.1, 21.2, 21.3 is guided to the associated beam guide system 2.1, 2.2, 2.3. The oscillators 21.1, 21.2, 21.3 are supplied with pump power of the pump source 10 via the optical switching unit 4. The optical switching unit 4 is switched, as described for Fig. 1.

The MOPP 12 can also be divided into several MOPA 22.1, 22.2, 22.3 (Fig. 3). These MOPP 22.1, 22.2, 22.3 can be arranged in the vicinity of the platforms 7, 8, 9. An output of the amplifier of the MOPP 22.1, 22.2, 22.3 is aligned with the associated beam guide system 2.1, 2.2, 2.3. The amplifier of the MOPA 22.1, 22.2, 22.3 is supplied with pump power of the pump source 10 via the optical switching unit 4. The mode of operation and the switching of the optical switching unit 4 take place as described in Fig. 1.

In these embodiments, the HEL effectors 5.1, 5.2, 5.3 are formed by a common pump source 10 (plus power supply and cooling device 11), the optical switching unit 4, the oscillators 21.1, 21.2, 21.3 or MOPA 22.1, 22.2, 22.3 and the intrinsic beam guides 2.1, 2.2, 2.3, as well as the optical connections 15, ideally optical fibers.

Fig. 4 shows another solution variant of the inventive idea, starting from Fig. 3. The embodiment according to Fig. 3 shows the variant according to which the entire MOPA 22.2, 22.3 can be mounted separately from the pump source 10 in the vicinity of the pump source 10 or the beam guide systems 2.1, 2.2, 2.3.

According to Fig. 4, a further step in realizing the concept is now to execute these MOPA 22.1, 22.2, 22.3 in such a way that a joint master oscillator (MO) 22 can be created for and used by the remaining amplifiers 1, 2, 3. This minimizes, in particular, the weight to be mounted since only the respective amplifier 1, 2, 3 would have to be mounted.

For this embodiment, a further optical switching unit 14 is used which, like the optical switching unit 4 for the pump power, can also simultaneously connect the central master oscillator 22 with the individual amplifiers 1, 2, 3. This optical switching unit 14 should meet the same requirements as the optical switching unit 4. For this purpose, the optical switching unit 14 is located between the output of the master oscillator 22 and an input of the amplifiers 1, 2, 3 and switches the output of the master oscillator 22 to the respective input of the amplifiers 1, 2, 3. A further input of the amplifiers 1, 2, 3 is reserved for feeding the pump power of the pump source 10.

In this fourth embodiment, the HEL effectors 5.1, 5.2, 5.3 are provided by a central pump source 10, a central master oscillator (MO) 22, the individual, intrinsic amplifiers).1, 2, 3, which are aligned with the intrinsic beam guide system 2.1, 2.2, 2.3, and the optical connections 15, ideally optical fibers.

It goes without saying that, within the scope of the inventive idea, more than one weapon system 100 is also attached to the object, for example a port-side weapon system or a starboard-side weapon system, etc.

## Patentkrav

**1.** Våpensystem (100) som omfatter minst to High Energy Laser (HEL) effektorer (5.1, 5.2, 5.3), som hver har minst ett stråleføringssystem (2.1, 2.2, 2.3), hvor de minst to HEL-effektorene (5.1, 5.2, 5.3) omfatter minst én felles anvendbare pumpekilde (10), hvor minst én optiske koblingsenhet er tilveiebragt, hvor den minst ene optiske koblingsenheten (4, 14) er utformet slik at det minst ene stråleføringssystemet (2.1, 2.2, 2.3) kan bli forbundet med den minst ene felles anvendbare pumpekilden (10) via den minst ene optiske koblingsenheten (4, 14), **karakterisert ved at** enten

a) en felles anvendt master-oscillator (22) som er anordnet separat fra pumpekilden (10) fra de minst to HEL-effektorene (5.1, 5.2, 5.3) er tilveiebragt, en respektiv HEL-effektor (5.1, 5.2, 5.3) som omfatter en forsterker (.1, .2, .3), og den minst ene optiske koblingsenheten (4) som er anordnet mellom en utgang fra den minst ene felles anvendbare pumpekilden (10) og en inngang til den respektive forsterkeren (.1, .2, .3) av den respektive HEL-effektoren (5.1, 5.2, 5.3),

eller

b) en respektiv HEL-effektor (5.1, 5.2, 5.3) omfatter en Master-Oscillator and Power-Amplifier (MOPA) (21.1, 21.2, 21.3), og den minst ene optiske koblingsenheten (4) er anordnet mellom en utgang fra den minst ene felles anvendbare pumpekilden (10) og en inngang til en respektiv forsterker av den respektive MOPA (21.1, 21.2, 21.3) til den respektive HEL-effektoren (5.1, 5.2, 5.3).

**2.** Våpensystem (100) ifølge krav 1, **karakterisert ved at** den minst ene master-oscillatoren (22) kan bli forbundet via minst én ytterligere optisk koblingsenhet (14), innført mellom en utgang av master-oscillatoren (22) og en ytterligere inngang av forsterkeren (.1, .2, .3) til den spesielle HEL-effektoren (5.1, 5.2, 5.3), for å skape HEL-effektorene (5.1, 5.2, 5.3).

**3.** Våpensystem (100) ifølge ett av krav 1 eller 2, **karakterisert ved** en kontroller (6).

**4.** Våpensystem (100) ifølge krav 1 til 3, **karakterisert ved at** den minst ene optiske koblingsenheten (4, 14) er utformet slik at laserlyset kan bli delt inn i minst to utganger av den optiske koblingsenheten (4, 14), spesielt også samtidig.

**5.** Våpensystem (100) ifølge krav 1 til 4, **karakterisert ved at** den minst ene optiske koblingsenheten (4, 14) er en optisk bryter eller en optisk koblings-anordning.

**6.** Våpensystem (100) ifølge krav 1 til 5, **karakterisert ved at** stråleeffekten av den minst ene felles anvendbare pumpekilden (10) til HEL-effektorene (5.1, 5.2, 5.3) er justerbar og/eller variabel av den optiske koblingsenheten (4, 14).

**7.** Våpensystem (100) ifølge krav 6, **karakterisert ved at** stråleeffekten kan bli delt mellom 0 % og 100 %.

**8.** Våpensystem (100) ifølge krav 6 eller krav 7, **karakterisert ved at** kontinuerlig eller flertrinnsdeling av stråleeffekten til den minst ene felles anvendbare pumpekilden (10) kan finne sted.

**9.** Våpensystem (100) ifølge krav 1 til 8, **karakterisert ved at** HEL-effektorene kan bli overført til en sikkerhetstilstand via den minst ene optiske koblingsenheten (4, 14).

**10.** Objekt som har et våpensystem (100) ifølge krav 1 til 9, **karakterisert ved at** pumpekilden(e) (10) og/eller master-oscillatoren (22) er anordnet sentralt og/eller desentralt, i forhold til stråleføringene (2.1, 2.2, 2.3) på eller i objektet.

**11.** Objekt ifølge krav 10, **karakterisert ved at** det minst ene stråleførings-systemet (2.1, 2.2, 2.3) av de minst to HEL-effektorene er montert på plattformer (7, 8, 9).

**12.** Objekt ifølge krav 10 eller krav 11, **karakterisert ved at** objektene er av en stasjonær type, slik som hus, bunkere eller containere, eller av en bevegelig type, slik som kjøretøy for land, luft og sjø eller containere.

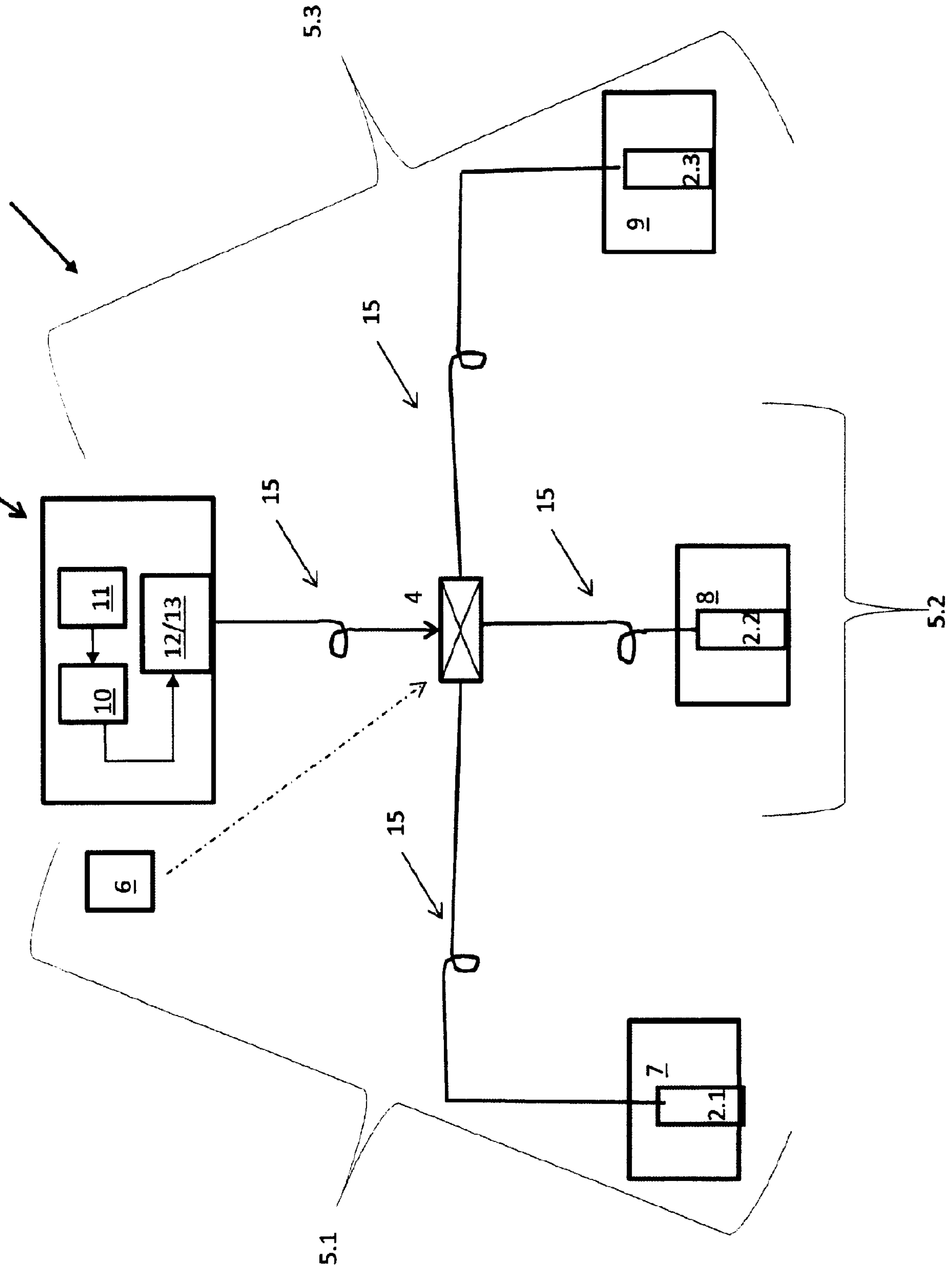


Fig. 1

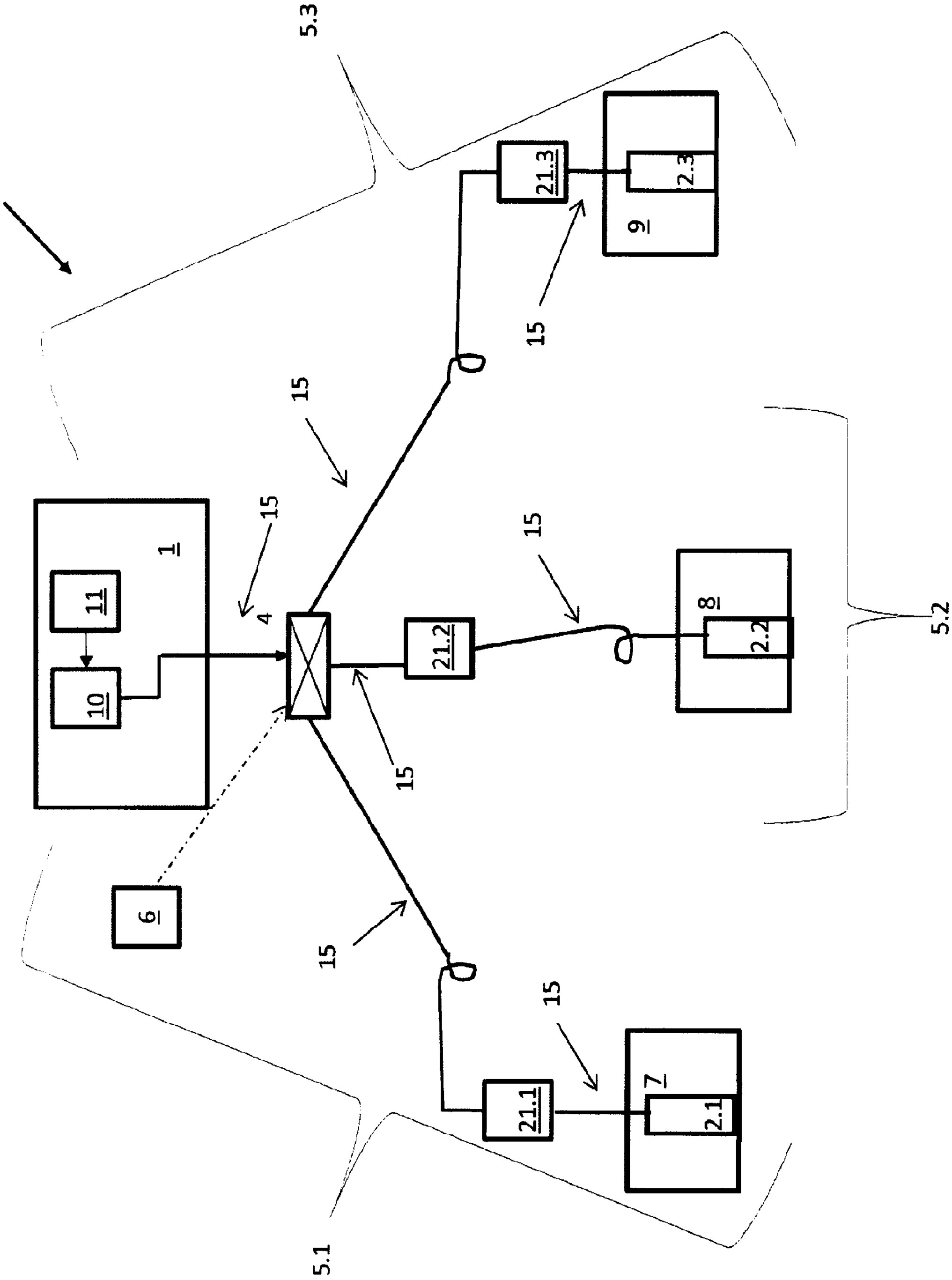


Fig. 2

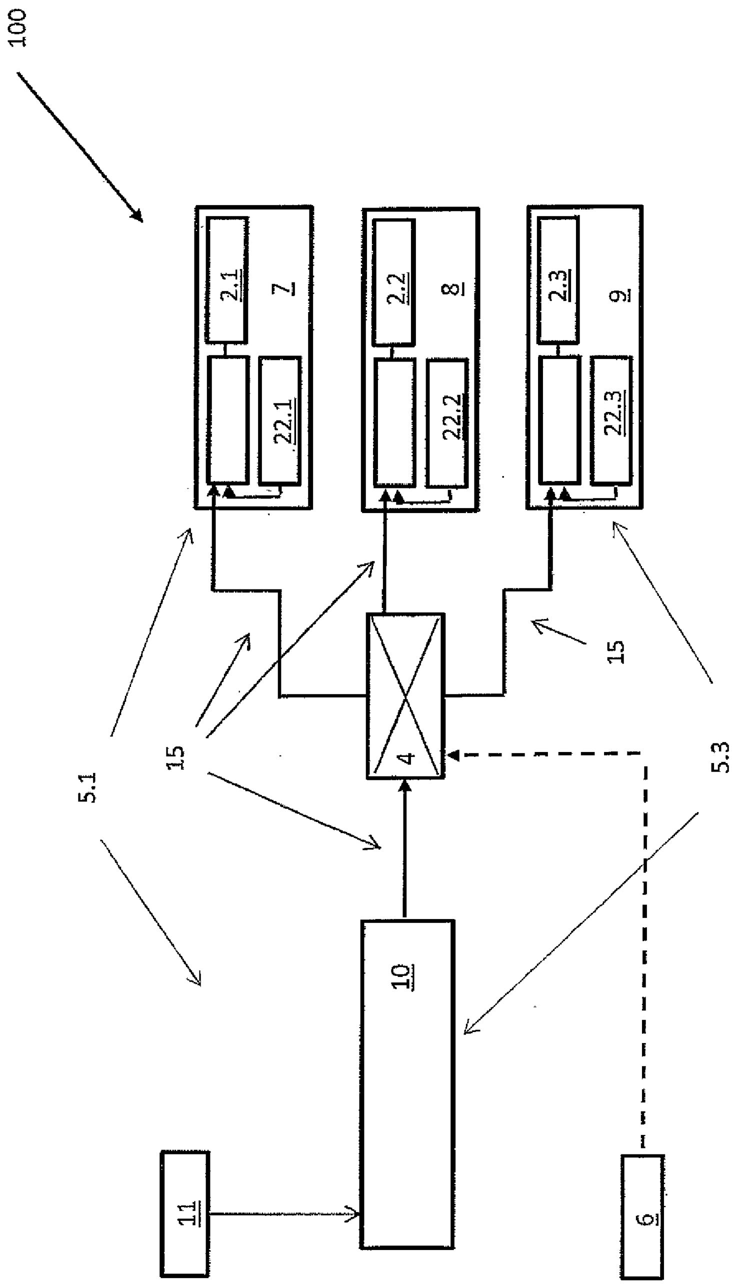


Fig. 3

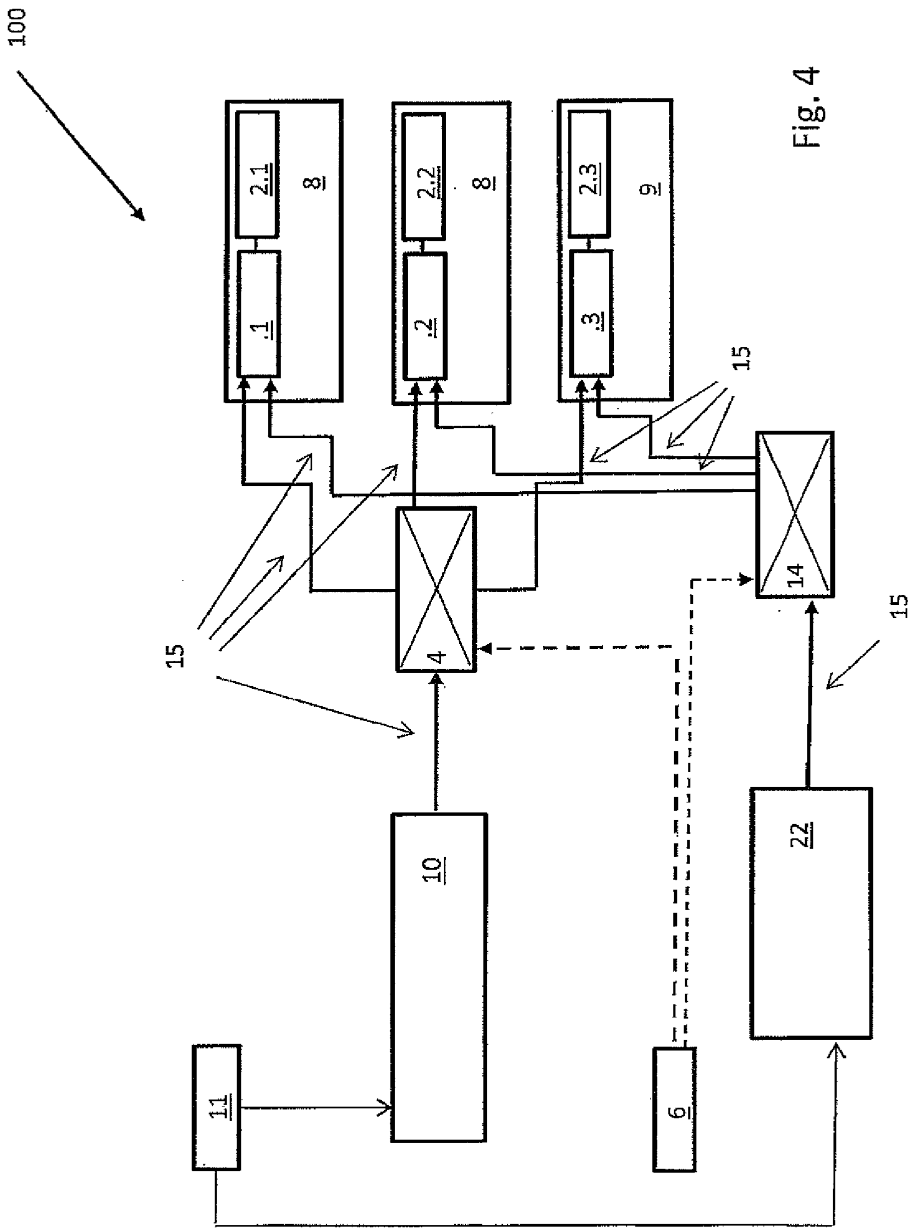


Fig. 4

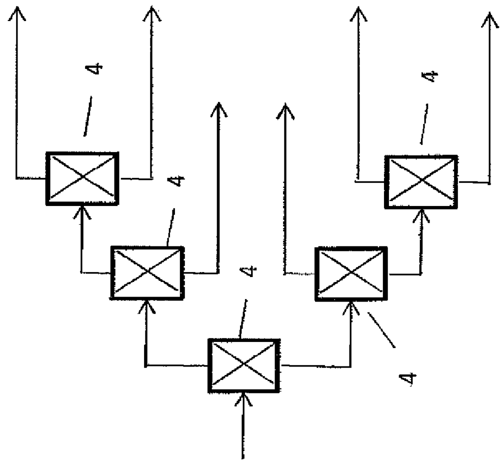


Fig. 5