

(15)

end of the optical cable 4. Light radiator 5 of this embodiment has, for instance, a plurality of semi-transparent prisms 5a provided inside. Light transmitted through optical transmitting means 4 is introduced into light radiator 5. Part of the light passes through semitransparent prisms 5a. The remaining part of the light is reflected by semi-transparent prisms 4a. As a result, all the light is finally radiated to the outside through the side wall of light radiator 5. A detailed description of light radiator 5 of this embodiment may be found in JP-A-56-66941.

Fig. 7 is a cross-sectional view illustrating another embodiment of light radiator 5 attached to the end of optical transmitting means 4. Light radiator 5 of this embodiment has light reflecting plate 5b provided inside. The side of light reflecting plate 5b to which the light is introduced is formed as a light reflecting mirror surface. Light reflecting plate 5b is pivotally mounted in light radiator 5 by, for example, pin P, and is biased to the direction shown by arrow A by means of spring 5c. In addition, the angle defined by light reflecting plate 5b may be adjustable by means of, for example, adjusting string 6. Therefore, if the angle θ of light reflecting plate 5b is adjusted at the position shown in the drawing (in this case θ is about 45°) by tensioning adjusting string 6, the light transmitted through optical transmitting means 4 and introduced into light radiator 5 is reflected by light reflecting plate 5b and radiated downwardly in a substantially vertical direction into the sea, as shown in the drawing. If light reflecting plate 5b is adjusted as shown by the imaginary line in the drawing by loosening adjusting string 6, the light radiated from optical transmitting means 4 goes straight forward without being reflected by light reflecting plate 5b and is radiated in the horizontal direction into the sea. As clearly understood from the foregoing explanation, light reflecting plate 5b can be optionally adjusted between the positions indicated by the real line and the imaginary line in the drawing by adjusting the tension of adjusting string 6. Therefore, the light transmitted through optical transmitting means 4 can be adjusted to the radiated in the desired direction between the vertical downward direction and the horizontal direction by means of light reflecting plate 5b.

According to the present invention, the light can be radiated into the sea from the light leakage portion or the light radiator constituted as mentioned above, although the light source system may be situated on a ship, the light leakage portion or the light radiator may be located on or in the sea, and the light transmitting media or means optically inter-connects therebetween. Therefore, it is neither necessary to arrange electric bulbs on or in the sea or to provide electric leakage or short-circuits. Generally speaking, when radiating light onto or into the sea to attract fish, various techniques are used to attract the fish more effectively. For example, the light may be alternately turned on and off. Or, a plurality of

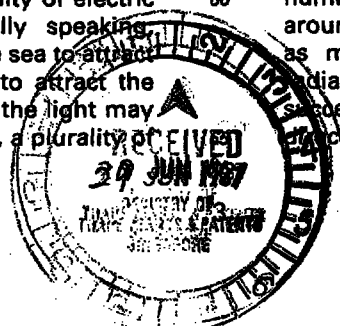
radiating spots may be provided and successively turned off from the spot furthest from the desired area to the spot nearest the desired area, thus leading the fish in. To enable the device of the present invention to be used in the manner mentioned above, lens system 3 is constituted of a number of lenses and a light deflecting plate 7 is provided in front of lens system 3, as seen in Figs. 1 and 2, such that light deflecting plate 7 may be periodically inserted and removed to periodically turn on the light radiation. Alternatively, light deflecting plate 7 may be inserted such that the depth thereof is gradually increased over certain time intervals. In this way, it can first deflect the light introduced into the light transmitting means provided with a light leakage portion or a light radiator located at the furthest position, then deflect the light introduced into light transmitting means provided with light leakage portions or the light radiations located at nearer positions. This enables one to gradually lead fish at long distances to nearer areas for collection or trapping. If face 7a of light deflecting plate 7 is formed as a light reflecting mirror and light deflecting plate 7 can be inserted at a certain angle θ_0 with respect to the travelling direction of the parallel light, as shown in Fig. 1, the light reflected by light reflecting mirror surface 7a is returned toward light source 1 and reflected again by reflecting mirror 2. The reflected light then reaches lens system 3 through the portion under light deflecting plate 7 without coming into touch with light deflecting plate 7. Thus, the light source 1 can be effectively used. When providing a plurality of radiating spots successively turned off, as mentioned hereinbefore, this is especially effective in leading the fish, since the light radiating energy at the positions at which the light is radiated can be increased.

Figs. 8 through 10 are illustrations of light trappers of the present invention as mounted on a ship, wherein reference numeral 10 indicates the ship, 11 the light transmitting means, and 12 portions from which the light is radiated.

In the embodiment shown in Fig. 8, the light radiating portions are provided in the sea so as to radiate light in the horizontal direction, thereby making it possible to lead and collect the fish from a long distance toward the area in the vicinity of ship 10.

According to the embodiment shown in Fig. 9, a large number of light radiating portions are provided over an area far from too close to ship 10. Light deflecting plate 7 is moved, as mentioned hereinbefore, so that the light radiating portions are successively turned off from the furthest spots to the nearest spot to lead and collect/trap the fish from a long distance toward the area near ship 10.

In the embodiment shown in Fig. 10, a larger number of light radiating spots are provided around ship 10. Light deflecting plate 7 is moved, as mentioned hereinbefore, so that the light radiations from the light radiating portions are successively turned off, for instance, along the direction indicated by arrow B in Fig. 10, to lead



fish around ship 10 along the direction indicated by arrow B for collection/trapping in a certain area.

Although in the embodiments illustrated in Figs. 8 through 10, the light source is provided on the ship, the light source may also be provided on any suitable stationary object situated on the land or on the sea. In addition, although the light radiating spots are provided inside the sea according to the embodiments in Figs. 8 through 10, they may also be provided on the sea. Further, the direction in which the light is radiated is not necessarily limited to the horizontal direction, but may also be the vertical direction or any other desired direction of an angle between the horizontal and vertical directions, which angle or direction may be suitably selected on the basis of the species, amount, and so forth of the fish to be trapped.

Claims

1. A light radiation device comprising a light source (1), a reflecting mirror (2) for reflecting the light from said light source (1), a lens system (3) for focussing the light from the reflecting mirror (2), and an optical transmitting means (4), the device being characterised in that it is used for trapping fish with the reflecting mirror (2) functioning to change the light from the light source (1) to parallel light and the optical transmitting means (4) comprising a plurality of optical cables, each cable (4) being connected at one end to a corresponding one of a plurality of lenses (3) for receiving the light focused from its corresponding lens (3), and each optical cable (4) having connected to its other end a light radiator (5) for radiating the light transmitted thereto by its optical cable (4), said light radiators (5) and associated optical cables (4) being adapted to be laid on or in the sea along a fish leading route, there being a light deflecting plate (7) disposed at an angle between the light source (1) and the lenses (3) said light deflecting plate (7) being movable across the paths of light moving towards the lenses so as to shield selected ones of said lenses from the light.

2. A method of trapping fish using a light radiation device as claimed in claim 1, the method being characterised by the steps of laying the optical cables (4) and associated light radiators (5) on or in the sea along a fish leading route, and adjusting the light deflecting plate (7) successively to turn off, or prevent transmission of light to, the light radiators (5).

3. A method as claimed in claim 2 comprising using optical cables (4) of different lengths, and adjusting the light deflecting plate (7) successively to turn off, or prevent the transmission of light to the light radiators (5) starting with the light radiator (5) furthest away from the light source (1) and finishing with the light radiator (5) nearest to the light source (1).

4. A method as claimed in claim 2 or 3, comprising locating the light source (1) on a ship (10)

locating the optical cables (4) and associated light radiators (5) on or in the sea around the ship (10), and successively turning off, or preventing the transmission of light to, the light radiators (5) around the ship (10) by means of the light deflecting plate (7).

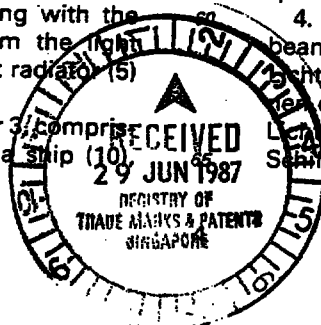
Patentansprüche

1. Lichtstrahlungsvorrichtung mit einer Lichtquelle (1), einem reflektierenden Spiegel (2) zum Reflektieren des Lichts von der Lichtquelle (1), einem Linsensystem (3) zum Fokussieren des Lichts von dem reflektierenden Spiegel (2) und optischen Übertragungseinrichtungen (4), wobei die Vorrichtung dadurch gekennzeichnet ist, daß sie zum Fangen von Fischen verwendet wird, wobei der reflektierende Spiegel (2) dazu dient, das Licht von der Lichtquelle (1) in paralleles Licht zu ändern und wobei die optischen Übertragungseinrichtungen (4) mehrere optische Kabel umfassen, von denen jedes Kabel (4) an einem Ende mit einer zugeordneten Linse von mehreren Linsen (3) verbunden ist, um das gebündelte Licht von seiner zugeordneten Linse zu empfangen, und von denen jedes an seinem anderen Ende mit einem Lichtstrahler (5) zum Abstrahlen des zu ihm von dem optischen Kabel (4) übertragenen Lichts verbunden ist, wobei die Lichtstrahler (5) und die zugeordneten optischen Kabel (4) geeignet sind, längs einer Fischleitroute auf oder in die See gelegt zu werden, und wobei eine Lichtablenkplatte (7) unter einem Winkel zwischen der Lichtquelle (1) und den Linsen (3) angeordnet ist, wobei die Lichtablenkplatte (7) quer zu den zu den Linsen führenden Lichtpfaden beweglich ist, um ausgewählte Linsen gegen das Licht abzuschirmen.

2. Verfahren zum Fangen von Fischen unter Verwendung einer Lichtstrahlungsvorrichtung wie sie in Anspruch 1 beansprucht ist, wobei das Verfahren durch die Schritte des Auslegens des optischen Kabels (4) und der zugehörigen Lichtstrahler (5) auf oder in der See längs einer Fischleitroute gekennzeichnet ist sowie durch das Einstellen der Lichtablenkplatte (7), um nacheinander die Lichtstrahler (5) abzuschalten oder die Übertragung von Licht zu denselben zu verhindern.

3. Verfahren wie es in Anspruch 2 beansprucht ist, umfassend: das Verwenden optischer Kabel (4) unterschiedlicher Länge und das Einstellen der Lichtablenkplatte (7), um nacheinander die Lichtstrahler (5) abzuschalten oder die Übertragung von Licht zu denselben zu verhindern, und zwar beginnend mit dem Lichtstrahler (5), der am weitesten von der Lichtquelle (1) entfernt ist, und endend mit dem Lichtstrahler (5), der der Lichtquelle (1) am nächsten ist.

4. Verfahren wie es in Anspruch 2 oder 3 beansprucht ist, umfassend: das Anordnen der Lichtquelle (1) auf einem Schiff (10), das Anordnen der optischen Kabel (4) und der zugehörigen Lichtstrahler (5) auf oder in der See rund um das Schiff (10) und das aufeinanderfolgende Abschalt-



fish around ship 10 along the direction indicated by arrow B for collection/trapping in a certain area.

Although in the embodiments illustrated in Figs. 8 through 10, the light source is provided on the ship, the light source may also be provided on any suitable stationary object situated on the land or on the sea. In addition, although the light radiating spots are provided inside the sea according to the embodiments in Figs. 8 through 10, they may also be provided on the sea. Further, the direction in which the light is radiated is not necessarily limited to the horizontal direction, but may also be the vertical direction or any other desired direction of an angle between the horizontal and vertical directions, which angle or direction may be suitably selected on the basis of the species, amount, and so forth of the fish to be trapped.

Claims

1. A light radiation device comprising a light source (1), a reflecting mirror (2) for reflecting the light from said light source (1), a lens system (3) for focussing the light from the reflecting mirror (2), and an optical transmitting means (4), the device being characterised in that it is used for trapping fish with the reflecting mirror (2) functioning to change the light from the light source (1) to parallel light and the optical transmitting means (4) comprising a plurality of optical cables, each cable (4) being connected at one end to a corresponding one of a plurality of lenses (3) for receiving the light focused from its corresponding lens (3), and each optical cable (4) having connected to its other end a light radiator (5) for radiating the light transmitted thereto by its optical cable (4), said light radiators (5) and associated optical cables (4) being adapted to be laid on or in the sea along a fish leading route, there being a light deflecting plate (7) disposed at an angle between the light source (1) and the lenses (3) said light deflecting plate (7) being movable across the paths of light moving towards the lenses so as to shield selected ones of said lenses from the light.

2. A method of trapping fish using a light radiation device as claimed in claim 1, the method being characterised by the steps of laying the optical cables (4) and associated light radiators (5) on or in the sea along a fish leading route, and adjusting the light deflecting plate (7) successively to turn off, or prevent transmission of light to, the light radiators (5).

3. A method as claimed in claim 2 comprising using optical cables (4) of different lengths, and adjusting the light deflecting plate (7) successively to turn off, or prevent the transmission of light to the light radiators (5) starting with the light radiator (5) furthest away from the light source (1) and finishing with the light radiator (5) nearest to the light source (1).

4. A method as claimed in claim 2 or 3 comprising locating the light source (1) on a ship (10)

locating the optical cables (4) and associated light radiators (5) on or in the sea around the ship (10), and successively turning off, or preventing the transmission of light to, the light radiators (5) around the ship (10) by means of the light deflecting plate (7).

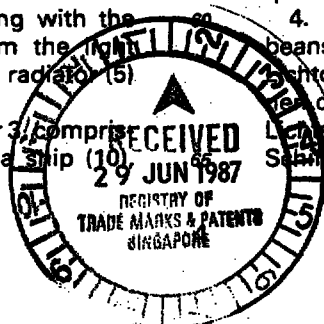
Patentansprüche

1. Lichtstrahlungsvorrichtung mit einer Lichtquelle (1), einem reflektierenden Spiegel (2) zum Reflektieren des Lichts von der Lichtquelle (1), einem Linsensystem (3) zum Fokussieren des Lichts von dem reflektierenden Spiegel (2) und optischen Übertragungseinrichtungen (4), wobei die Vorrichtung dadurch gekennzeichnet ist, daß sie zum Fangen von Fischen verwendet wird, wobei der reflektierende Spiegel (2) dazu dient, das Licht von der Lichtquelle (1) in paralleles Licht zu ändern und wobei die optischen Übertragungseinrichtungen (4) mehrere optische Kabel umfassen, von denen jedes Kabel (4) an einem Ende mit einer zugeordneten Linse von mehreren Linsen (3) verbunden ist, um das gebündelte Licht von seiner zugeordneten Linse zu empfangen, und von denen jedes an seinem anderen Ende mit einem Lichtstrahler (5) zum Abstrahlen des zu ihm von dem optischen Kabel (4) übertragenen Lichts verbunden ist, wobei die Lichtstrahler (5) und die zugeordneten optischen Kabel (4) geeignet sind, längs einer Fischleitroute auf oder in die See gelegt zu werden, und wobei eine Lichtablenkplatte (7) unter einem Winkel zwischen der Lichtquelle (1) und den Linsen (3) angeordnet ist, wobei die Lichtablenkplatte (7) quer zu den zu den Linsen führenden Lichtpfaden beweglich ist, um ausgewählte Linsen gegen das Licht abzusichern.

2. Verfahren zum Fangen von Fischen unter Verwendung einer Lichtstrahlungsvorrichtung wie sie in Anspruch 1 beansprucht ist, wobei das Verfahren durch die Schritte des Auslegens des optischen Kabels (4) und der zugehörigen Lichtstrahler (5) auf oder in der See längs einer Fischleitroute gekennzeichnet ist sowie durch das Einstellen der Lichtablenkplatte (7), um nacheinander die Lichtstrahler (5) abzuschalten oder die Übertragung von Licht zu denselben zu verhindern.

3. Verfahren wie es in Anspruch 2 beansprucht ist, umfassend: das Verwenden optischer Kabel (4) unterschiedlicher Länge und das Einstellen der Lichtablenkplatte (7), um nacheinander die Lichtstrahler (5) abzuschalten oder die Übertragung von Licht zu denselben zu verhindern, und zwar beginnend mit dem Lichtstrahler (5), der am weitesten von der Lichtquelle (1) entfernt ist, und endend mit dem Lichtstrahler (5), der der Lichtquelle (1) am nächsten ist.

4. Verfahren wie es in Anspruch 2 oder 3 beansprucht ist, umfassend: das Anordnen der Lichtquelle (1) auf einem Schiff (10), das Anordnen der optischen Kabel (4) und der zugehörigen Lichtstrahler (5) auf oder in der See rund um das Schiff (10) und das aufeinanderfolgende Abschalt-



ten der Lichtstrahler rund um das Schiff bzw. das Verhindern der Übertragung von Licht zu denselben mit Hilfe der Lichtablenkplatte (7).

Revendications

1. Dispositif d'émission de lumière comportant une source lumineuse (1), un miroir réfléchissant (2) destiné à réfléchir la lumière provenant de ladite source lumineuse (1), un système de lentilles (3) pour focaliser la lumière provenant du miroir réfléchissant (2) et un dispositif de transmission optique (4), le dispositif étant caractérisé en ce qu'il est utilisé pour attraper du poisson, le miroir réfléchissant (2) ayant pour fonction de changer la lumière provenant de la source lumineuse (1) en une lumière parallèle et le dispositif de transmission optique (4) consistant en plusieurs câbles optiques, chaque câble (4) étant branché par une extrémité sur l'une correspondante de plusieurs lentilles (3) pour recevoir la lumière focalisée par sa lentille correspondante (3) et chaque câble optique (4) étant branché par son autre extrémité sur un émetteur de lumière (5) qui émet la lumière qui lui est transmise par son câble optique (4), lesdits émetteurs de lumière (5) et les câbles optiques (4) associés étant adaptés pour être placés sur ou dans la mer le long d'une route de déplacement du poisson, une plaque de déviation de lumière (7) étant disposée sous un angle entre ladite source lumineuse (1) et les lentilles (3), ladite plaque de déviation de lumière (7) étant mobile en travers des trajets de

la lumière se propageant vers les lentilles de manière à obturer pour la lumière certaines sélectionnées desdites lentilles.

2. Procédé pour attraper du poisson en utilisant un dispositif d'émission de lumière tel que revendiqué dans la revendication 1, le procédé étant caractérisé en ce qu'il consiste à disposer des câbles optiques (4) et les émetteurs de lumière (5) associés sur ou dans la mer le long d'une route de déplacement du poisson et à régler la plaque de déviation de lumière (7) pour intercepter ou éviter successivement la transmission de lumière vers les émetteurs de lumière (5).

3. Procédé selon la revendication 2, consistant à utiliser des câbles optiques (4) de longueurs différentes, et à régler la plaque de déviation de lumière (7) pour intercepter ou éviter successivement la transmission de lumière vers les émetteurs de lumière (5) en commençant par l'émetteur de lumière (5) le plus éloigné de la source lumineuse (1) et en terminant avec l'émetteur de lumière (5) le plus proche de la source lumineuse (1).

4. Procédé selon la revendication 2 ou 3, consistant à disposer la source lumineuse (1) sur un bateau (10), à disposer les câbles optiques (4) et les émetteurs de lumière (5) associés sur ou dans la mer autour du bateau (10) et à intercepter ou éviter successivement la transmission de lumière vers les émetteurs de lumière (5) autour du bateau (10) au moyen de la plaque de déviation de lumière (7).

