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SEARCHLIGHT ASSEMBLY FOR WEAPONS CARRIERS, PARTICULARLY FOR ARMORED VEHICLES

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Fig. 1

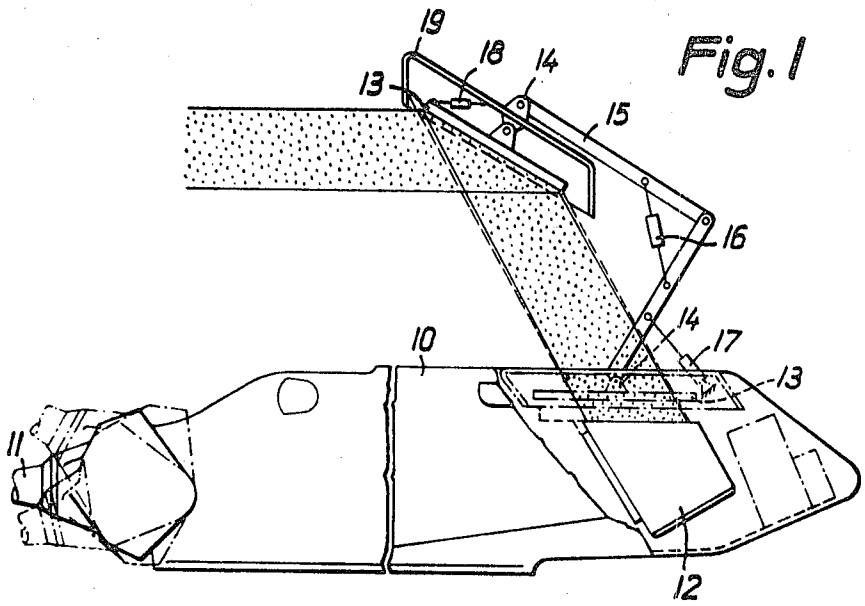



Fig. 2

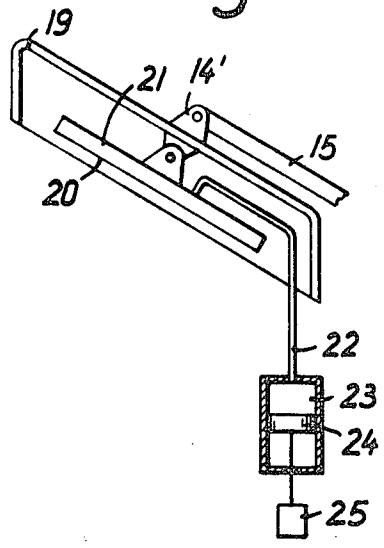
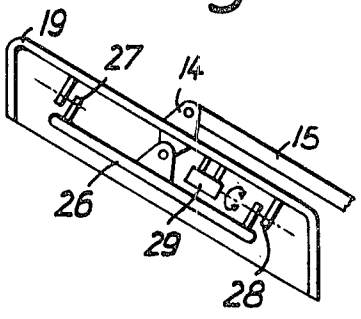



Fig. 3




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# SEARCHLIGHT ASSEMBLY FOR WEAPONS CARRIERS, PARTICULARLY FOR ARMORED VEHICLES

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## ABSTRACT OF THE DISCLOSURE

A searchlight is mounted within the housing of an armored vehicle, and a mirror is retractably coupled to the housing for movement between a retracted position within the housing and an extended position outside of the housing, the mirror being positioned to receive and to reflect light from the light source in its extended position. Means are provided for varying the orientation of the mirror in its extended position to vary the direction of the light beam reflected therefrom. The mirror is mounted on a telescoping mast in Cardanic suspension and is coupled to the optical alignment system of the weapons carrier so as to follow the alignment movements of the weapon carried thereby.

## BACKGROUND OF THE INVENTION

The present invention relates to a searchlight assembly for weapons carriers, particularly armored vehicles, for reconnaissance and target illumination by at least one searchlight having a narrow beam.

If a weapon carrier is used to observe or attack targets during darkness with the aid of a searchlight, it is necessary that the searchlight be movably mounted so that it can follow the alignment movement of the optical target alignment system for the weapon of the weapons carrier. If possible, the point of intersection of the axis of the light beam emanating from the searchlight with the line of sight of the optical target alignment system should be at the projectile impact point for the weapon of the weapons carrier. For this purpose, it is advantageous to have the axis of the light beam as high as possible above the ground to minimize illumination of the area between the weapons carrier and the target and to reduce the danger of self-illumination of the weapons carrier, for example, by illuminating the powder cloud after a shot from the weapon, and to make it more difficult for the enemy to determine the range of the weapons carrier. It is also advantageous to have the distance between the light beam axis and the line of sight of the weapon as large as possible because this produces better contrast and the target can thus be more easily recognized.

The above-mentioned requirements, however, are only partially met with the known searchlight assemblies for weapons carriers. In most cases, the searchlight is mounted near the optical system and is coaxially coupled with the main weapon. In armored vehicles, the searchlight is generally disposed at the gun slit and is thus aligned with the weapon.

## SUMMARY OF THE INVENTION

It is an object of the present invention to provide a searchlight assembly with which a particularly favorable target illumination can be achieved.

In accordance with this invention, the above-noted objective is achieved by a novel searchlight assembly including a mirror which can be telescoped out of a weapons carrier by means of a mast or the like and whose height above the weapons carrier is variable, and by a searchlight mounted within the housing of the weapons carrier, the beam of the searchlight being reflected in the desired direction by the mirror whose position on the telescoping mast is variable.



The reflection of the light beam from the searchlight by means of a mirror provides a number of advantages. The searchlight can be mounted within the weapons carrier under protection of the armor so that it will be substantially protected against damage from bullets or shell fragments. Although the mirror is not always protected against such damage, a reflective surface is less sensitive to such damage than a searchlight. Moreover, a damaged mirror can be replaced much more easily than an entire searchlight. Since illumination of the target is necessary only during darkness and then only when required, the mirror can be stored, with the aid of the telescoping mast, inside the weapons carrier also. Thus, the mirror is then also substantially protected when it is not in active use.

A further advantage of the present invention is that the beam reflected by the mirror can follow the alignment movements of the optical target alignment system much better than a relatively heavy searchlight. The telescoping mast further permits the axis of the light beam to be raised to a considerable height above the ground so that substantially only the target area is illuminated and illumination of the area between the weapons carrier and the target is eliminated. The relatively high elevation of the light beam also makes it more difficult for the enemy to find the range of the weapons carrier since he does not know the height of the light beam. The relatively large distance between the axis of the light beam and the line of sight of the optical target alignment system furthermore produces a target picture of great contrast so that the target can be more easily recognized and attacked. Moreover, the range of observation is considerably increased.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIGURE 1 is a partially cut-away vertical elevational view of the turret of a weapons carrier containing one illustrative searchlight assembly of this invention.

FIGURE 2 shows a special device for mechanically deforming the mirror of this invention to influence the reflected light beam of the searchlight.

FIGURE 3 shows a vibrator for imparting a horizontal oscillation to the mirror of this invention to horizontally fan out the reflected light beam of the searchlight.

## DESCRIPTION OF THE PREFERRED EMBODIMENTS

Before discussing the disclosed embodiment in detail, the general principles of the invention will first be discussed. In order to be able to move the light beam from the searchlight reflected by the mirror in all directions, it is advisable, according to a further proposal of the present invention, to place the mirror on the telescoping mast or the like in Cardanic suspension. Since the searchlight assembly serves first of all to aid in the recognition of targets to be attacked with the weapons of a weapons carrier during darkness and to illuminate these targets, it is further advisable that the mirror be coupled to the optical alignment system of the weapons carrier in such a manner that it follows the alignment movements of the weapon.

The illumination of a distant target should, if possible, be such that only the target area is illuminated brightly and with full contrast. Illumination of the area between the target and the weapons carrier leads to a decrease in contrast and shortens the range of sight. An improvement in the target illumination can be achieved by horizontal diffusion of the light beam. The present invention proposes therefore in a further embodiment that the

mirror be mechanically deformable by means of a special device in order to influence the reflected light beam of the searchlight.

Another possibility for influencing the reflected light beam of the searchlight consists in oscillating the mirror with a vibrator or the like to horizontally fan out the light beam.

If the searchlight assembly according to the present invention is used for armored vehicles with rotatable turrets, it is further proposed to dispose the searchlight on the inside of the turret on the side away from the weapon and to also mount the telescoping mast or the like which carries the mirror within the turret.

The specific disclosed embodiment of the invention will now be discussed with reference to FIGURE 1. The armored turret or housing **10** with a gun barrel **11** contains a fixedly mounted searchlight **12** within housing **10** on the side away from the gun. The light beam of the searchlight **12** is directed to a mirror **13**, which is mounted by means of a Cardanic suspension **14** on a telescoping mast **15**. The telescoping mast **15** is movable between a retracted position within housing **10** and an extended position which is illustrated in the figure. When in operation, the telescoping mast **15** is moved out of the armored turret or housing **10** by hydraulic cylinders **16** and **17**. A change in the position of the mirror **13** around its horizontal axis is accomplished with a hydraulic cylinder **18** mounted on the protective frame **19** which encloses the mirror **13**. Movement of mirror **13** in its horizontal plane occurs simultaneously with rotation of the turret or housing **10**. The protective frame **19** is so constructed that it will intercept light beams that would otherwise be scattered from the searchlight **12**.

A further possibility of influencing the light beam reflected by the mirror **13** consists in oscillating the mirror **13** in a horizontal plane around its pivot point in the suspension **14**.

When the searchlight is not operated, e.g., during the daylight hours, the telescoping mast **15** with the mirror **13** can be retracted into the armored turret or housing **10**. The rest position within the armored turret or housing **10** is shown by dashed lines in the figure.

FIGURE 2 shows a special device for mechanically deforming mirror **20** to influence the reflected light beam of the searchlight. Mirror **20**, in the place of mirror **13** shown in FIGURE 1, is mounted by means of a Cardanic suspension on a telescoping mast **15**, and protected by frame **19**. Mirror **20** forms a membrane extended over one open side of a box-shaped, pressure tight frame **21**. Pressure is introduced into the space between frame **21** and mirror **20** via a pressure hose **22** which is connected to a cylinder **23**. When a piston **24** is actuated in cylinder **23** by means of a control drive **25**, the pressure within cylinder **23**, and between frame **21** and mirror **20** is altered, which results in elastic concave or convex deformation of mirror **20**.



FIGURE 3 is aschematic view of another mirror **26** mounted on telescoping mast **15** by means of a suspension **14'**, this mirror **26** being additionally hinged at axes **27**, **28** for oscillatory rotational movement to horizontally fan out the reflected light beam of the searchlight. Oscillations are imparted to mirror **26** by means of a vibrator **29** coupled to axis **28**.

I claim:

**1.** In a weapons carrier including a weapon housing, a searchlight assembly comprising, in combination:

(a) a light source mounted inside of said housing and directed outwardly from said housing through an opening therein;

(b) a mirror mounted on a telescoping mast, said mast retractably coupling said mirror to said housing for movement between a retracted position within said housing and an extended position outside of said housing, said mirror being mounted on said telescoping mast by means of a Cardanic suspension and being positioned to receive and to reflect light from said light source when in said extended position; and

(c) means for varying the position of said mirror, when said mirror is in said extended position, to vary the direction of light reflected therefrom.

**2.** A searchlight assembly as defined in claim **1** for armored vehicles wherein said weapon housing comprises a rotatable turret, and wherein said searchlight is disposed within the turret on the side thereof away from the weapon, and wherein the retractable mounting for the mirror is also disposed within the turret.


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U.S. Cl. X.R.

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