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Gonsalves

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[54] **AERIAL BOMB AND OPTICAL LIGHT BEAM GUIDANCE SYSTEM THEREFOR**

[76] Inventor: **Joseph E. Gonsalves,** 5813 40th Ave., Hyattsville, Md. 20782

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[51] **Int. Cl.** **F41g 7/00**

[58] **Field of Search** 244/3.15, 3.13, 3.16, 3.21, 244/3.22, 3.24, 3.3, 3.18

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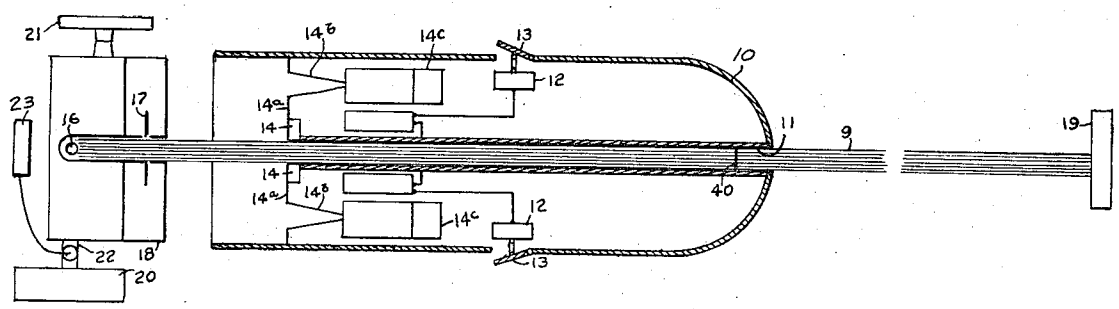
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Primary Examiner—Samuel Feinberg
Assistant Examiner—H. J. Tudor

[57] **ABSTRACT**

An optical light beam guiding system comprising the use of a single concentrated parallel small diameter beam of light rays, which may be of the visible, or invisible, ultraviolet or infra-red, or laser or maser type. They may also be produced by the use of a light source which itself produces a light with a narrow restricted range of wave lengths.

36 Claims, 8 Drawing Figures



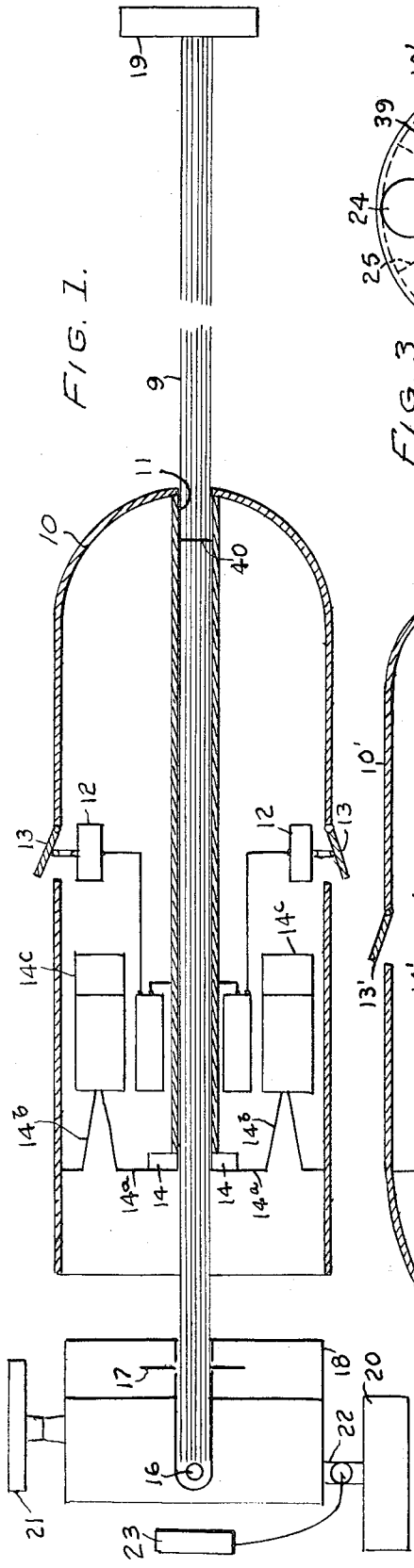


FIG. 1.

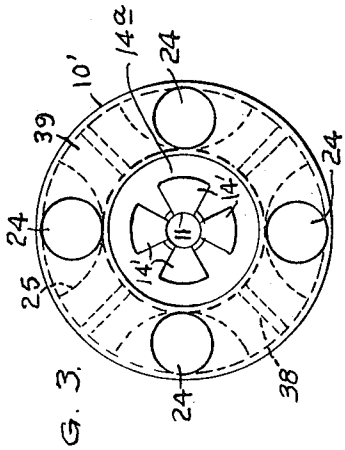


FIG. 3.

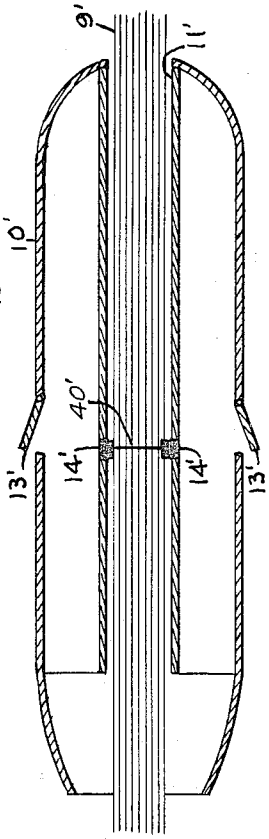


FIG. 8.

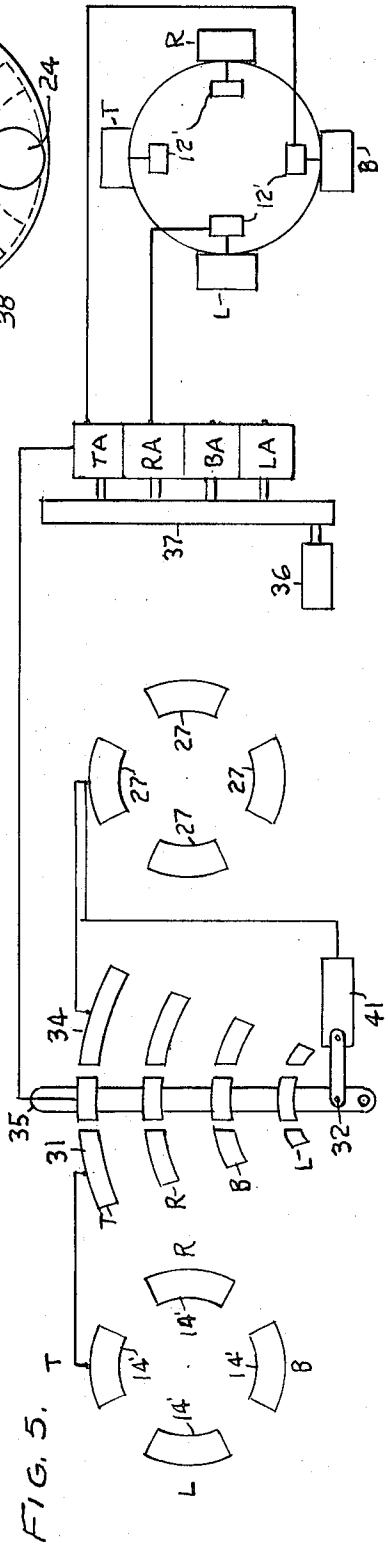


FIG. 5.

FIG. 2.

FIG. 4.

FIG. 7.

FIG. 6.

AERIAL BOMB AND OPTICAL LIGHT BEAM GUIDANCE SYSTEM THEREFOR

The light beam so produced cooperates with elements on an explosive device, such as a bomb or missile to be guided, so that the bomb or missile will follow the path of the concentrated beam of light, which passes directly through a longitudinal opening in the bomb or missile, from its launching base to its target regardless of movement of the target during the period of the flight of the bomb or missile. This is accomplished by the operator of the launching base keeping the light beam directed on the target at all times, during the flight of the bomb or missile to the target so that the light sensing devices on the bomb or missile can control the movement of the bomb or missile to the target by merely following the light beam path regardless of the movement of the target during the flight of the bomb or missile thereto.

The present invention is directed to a guidance system for bombs or missiles whereby a concentrated beam of light may be used to guide a bomb or missile from a launching base to a target. The launching base used may be a substantially stationary base such as a space or satellite station, a helicopter which can hover in the same position for at least a few seconds, a balloon, or a temporarily fixed ground station such as a missile launcher for anti-aircraft use or any other type of stationary or movable targets, a bazooka type launcher for use against tanks or other stationary or movable positions.

Another object of this invention is to provide a guidance system whereby the bomb or missile may be accurately aimed at the target prior to firing the bomb or missile from the launching base and which may further during the whole period in which the bomb or missile is travelling to the target, be kept on its direct flight to the target regardless of any movement of the target during this period due to evasive action of the target or any changes in atmospheric conditions such as wind currents, for example.

Another object is to improve accuracy of missile devices by eliminating the need of providing any means for compensating for the range or distance to the target from the launching base.

This is accomplished by the built-in controls in the missile that act automatically by cooperation with the target oriented beam of light to keep the missile on a straight path from the launching base to the target regardless of the pull of gravity on the missile as it travels relative to the earth.

Another object is to provide means to impart lateral thrust to the bomb or missile to cause it to move back into its correct light path to the target, when during its flight thereto, it, for any reason, has moved out of the correct path.

The above is accomplished by the cooperation, of the concentrated beam of light guidance means, with a plurality of light sensors on the bomb or missile which are mounted around an opening located at the rear end of the bomb or missile and through which opening the beam of light passes in a direct line from the launching base to the target.

Another object is to provide a guidance system for a bomb or missile in which a light beam controls the greater part of the movement of the bomb or missile to the target from the launching base but when the bomb

or missile approaches the target another guidance system of a different type takes over which is more efficient as the bomb or missile nears the target.

The hollow longitudinal opening in the bomb or missile also tends to lessen the friction drag on the bomb or missile and also tends to stabilize the movement of the bomb or missile.

The bomb or missile structure is such that it prevents extraneous or unwanted light from hitting the light sensors during the flight of the bomb or missile and upsetting the control of the guidance system.

Further objects are to provide means for automatically shifting the control of the steering structure on the bomb or missile from one type of control means to another more efficient type of control means as the bomb or missile nears the target.

Another object is to automatically increase the power of the amplifiers, as the bomb or missile gets further from the launching base, to compensate for the weaker action of the light rays on the sensors.

With the above and other objects in view as will become apparent, this invention consists in the construction, combination and arrangement of parts all as hereinafter more fully described, claimed and illustrated in the accompanying drawings wherein:

FIG. 1 is a schematic cross section of the bomb guidance system with the aerial bomb spaced from its launching base on its way to the target;

FIG. 2 is a schematic cross section of the missile guidance system with the missile spaced from its launching base on its way to the target.

FIG. 3 is a cross sectional view taken on the line 3—3 of FIG. 2;

FIG. 4 is a cross sectional view taken on the line 4 — 4 of FIG. 2 but of a different form of missile structure.

FIG. 5 is a schematic view of the connections for automatically shifting the control of the missile guiding means from the light beam sensing means to the heat sensing means.

FIG. 6 is a fragmentary cross sectional view on line 6—6 of FIG. 7 of a modified from of bomb or missile device with the cross sectional view rotated 45° to the left.

FIG. 7 is a fragmentary cross sectional view on line 7—7 of the same modified form of bomb or missile device with the sectional view rotated 45° to the right.

FIG. 8 is a view similar to FIG. 1 of a modified form of the invention in which the position of the light sensors 14 and reticule 40 of FIG. 1 are shown at 14′ and 40′ in FIG. 8.

Referring to the drawing in detail, FIG. 1 shows a bomb 10 having an opening 11 (or tunnel) therein extending longitudinally thereof concentric with the center line of the bomb. There are four electromagnets 12 equally spaced around the inside of the periphery of the bomb each one connected to move a corresponding guiding vane 13 arranged to move into the air path at the outer surface of the bomb 10 to deflect the bomb sidewise when its corresponding electromagnet 12 is activated. The guiding vanes 13 are positioned on the bomb body 10 in a transverse plane that passes approximately through the center of gravity of the bomb 10. Since the guiding vanes 13 are so positioned the side thrust operates through the center of gravity of the bomb and therefore, does not produce any objectionable twisting or angular displacement of the bomb

while in flight to its target. It should be noted that the side thrust acts to move the bomb to the right to bring the hollow opening in the bomb into full alignment with the light beam guidance path when the bomb gets out of the correct light path during its travel to the target from the launching base when the light beam activates the light sensor **14** on the left.

The guidance vanes **13** are controlled by a plurality of light sensors **14** corresponding in number and position to the vanes **13** which are activated by the beam of light **9** before it passes longitudinally through the opening in the bomb. The light beam **9** is of a size corresponding to the inner diameter of the opening **11** in the bomb. As the bomb shifts position relative to the light beam due to changes in atmospheric conditions or in the positions of the target **19** as it moves to the target from the launching base, it activates one or more of the light sensors **14** through amplifiers **15** to control the movement of the guidance vanes **13** to bring the travelling bomb back into its central position on the guiding light beam so that it continues straight to its target. The sensors are connected to the vanes in such a manner that the sensor on the right activates the vane on the left, the sensor on the right controls the vane on the right, the sensor at the top controls the vane on the bottom and the one on the bottom controls the one at the top. This is necessary to move the bomb or missile laterally of the light path to bring it back to its correct travelling position.

The sensors **14** are so shaped and constructed that as the central light beam is shifted laterally in any direction the sensor applies a rapidly increasing force to the appropriate vane to apply a rapidly increasing thrust thereto.

The remaining area of the back wall **14*a*** is coated with reflecting material of the well known retroreflecting spherical small glass or plastic spheres which reflect light back to its source regardless of the direction of the light rays. This type reflector is well known and widely used and is a product of the well known 3M Company. In this manner light hitting the back end of the bomb or missile is reflected back to the operator at the launching base and he is thereby enabled to follow the path of the bomb or missile to the target.

The source of light **16** to produce the light beam used may be of any desired type that can produce an intense concentrated parallel light beam of a relatively narrow wave length band of light. The light so produced may be of any desired color, may be a visible or invisible band such as a band of ultra-violet or infra-red and may be produced by an optical maser or laser source. An especially desirable powerful light transmitter for guiding bombs or missiles along a light path for this purpose can be produced at present by means of lasers.

The light sensors may be expecially sensitive to the properties of the particular light beam or may utilize filters or polarizers to make them particularly sensitive to the light beam to thereby minimize interference to the control device due to the presence of other light in the vicinity of the sensors. The circular extending wall **8** on the bomb **10** also helps to prevent unwanted light from reaching the light sensors and thus affect the proper operation thereof.

The particular properties of light beams of the type mentioned above are well known and used in the optical art.

The aerial bomb **10** may be provided with any suitable power propulsion means indicated diagrammatically at **14*b*** for use when it is desirable to cut down the flight time of the aerial bomb from its launching base **20** to its target as when involved in enemy actions. In such cases a timer **14c** in the aerial bomb is used to activate the power plant a few seconds after the aerial bomb has been dropped from its launching base to its target.

The following patents:

Bedford	2,404,942	July 30, 1946
Bozeman	2,930,894	Mar. 29, 1960
Burton et al.	3,028,807	April 10, 1962
Statz et al.	3,277,396	Oct. 4, 1966
Heych	3,356,848	Dec. 5, 1967
Jones	3,364,356	Jan. 16, 1968
Girault	3,398,918	Aug. 27, 1968
Redmon et al.	3,447,033	May 27, 1969
Maillet	3,614,025	Oct. 19, 1971
British	441,866	Jan. 27, 1936
French	879,835	Dec. 10, 1942
German	1,168,513	Apr. 23, 1964

are referred to in which various types of light beams are used for generally similar purposes.

In order to control the size of the light beam a conventional adjustable diaphram **17** is used. Attention is especially called to the U.S. Pat. to: Redmon, et al, No. 3,447,033 May 27, 1969 which specifically refers to and shows the use of a laser beam unit **10, 11** in FIG. **1** for projecting a concentrated red laser light beam of parallel light rays to a target **20** having a reflective coating thereon to reflect the laser rays back to the operator of the device. The housing **18** for the light source is adjustably supported on a suitable launching base in space and may also support a conventional viewing device **21** depending on the type light beam being used for observing the target **19.**

The launching base **20** also supports the bomb **10** in position relative to the light beam **9** so that the light beam from the light source is in optical alighment therewith. The light housing **18** is adjustably supported on launching base **20** by means of a ball joint **22** or other similar device and its movement controlled by the conventional joy stick means **23** well known in the prior art.

In operation the bombardier aligns the light source and bomb so that the beam of light passing therethrough is directed at the target. At the proper moment he releases the bomb which drops directly to the target following the beam of light which is completely enclosed and surrounded by the bomb. If the bomb varies, due to any cause, from the straight line light path the beam of light will activate one or more of the light sensors spaced around the rear end of the opening in the bomb and control the movement of the appropriate steering vanes to bring the bomb back to its proper position relative to the light beam **9.** If on the other hand the target moves while the bomb is in flight the bombardier follows its movement by keeping the light beam on the target during its movement and this causes the light sensors on the bomb to be activated to again bring back the bomb to its proper light path to thus ensure the bomb hitting its target under any changing conditions.

FIG. **2** discloses a modification of the FIG. **1** form of the device which is especially designed to be used against enemy aircraft, or a ground target, such as a tank, a ship or other device. In this form of the device a

launching platform 20' supports a housing 18' enclosing any suitable source of light energy 16' producing a single concentrated parallel ray light beam 9' of any desired restricted range of wavelengths. Mounted in concentric relation to the light beam 9' produced by the source of light energy 16' is a missile 10'. The missile 10' is also supported by the housing 18' but in such relation thereto that no vibrations or other movement from the missile is imparted thereto when the missile is fired. The rear circumferential wall 39 is curved inwardly from the outer surface of the missile 10' to prevent unwanted light from interfering with the performance of the lights sensors 14'.

The housing 18' also carries a suitable viewing device 21', which are well known in this art, to enable the missile operator to view the position of the guiding light beam 9' relative to the target 19' at all times. The housing 18' supporting the source of light energy, the missile 10' and the viewing device 21' are all mounted on launching base 20' by means of any suitable universal connection 22'. The member 23 is a conventional single stick or joy stick control means for the missile operator to enable him to quickly and accurately move the housing 18' to direct the light beam 9', after it passes through the longitudinal opening in the missile to the target 19'. This type of single stick control is widely used and well known in the prior art being usually operated by hydraulic or electrical devices.

In order to increase the efficiency of the control means for moving the light beam and then the missile as the target moves, the fastest speed at which the sensors and thrust devices can move the missile for guidance correction should be determined by means of actual tests, if considered necessary. Once determined this factor should then be used to correlate the speed of movement built into the device for adjusting the movement of the housing to direct the light beam in following a moving target.

The speed of adjustment of the housing and thus the light ray path to the target should then be made equal to the maximum speed at which the sensors on the missile are able to bring the missile into the correct light ray path.

The operation of the light sensors 14' and steering vanes 13' by their coaction with the light beam 9' is the same as that of the corresponding parts in the FIG. 1 form of the device and need not be repeated here.

No correction need be used in firing at targets with the FIG. 2 form of the device since as the missile travels, on its flight path, any range correction needed to compensate for the pull of gravity on the missile in flights is automatically provided by the coaction of the straight line light beam acting on the light beam sensors.

The missile is driven by any suitable source of jet or rocket power acting through a plurality of openings 24 located at the rear end of the missile 10'. A heat resistant wall 25 surrounds each of the openings 24 to prevent the passage of any unwanted amount of heat to the light sensors 14'. Similar heat shields 26 are placed around each one of a plurality (four spaced heat sensors in the nose of the missile) of heat sensors 27. Any form of the numerous types of heat sensors for missiles can be used in this device. Stationary vanes 38 extend from the rear end of missile 10' to help stabilize it during its flight path.

The sensors 27 could be replaced by sensors for an infrared laser beam, reflected from the laser beam guidance beam, after it hits the target 19'.

The output from these sensors could then be fed to the amplyfiers and the guidance control vanes or jets in the same manner as shown and described in the structures shown in FIGS. 2, 4 and 5.

The missile structure disclosed in FIG. 4 is generally similar to that described in FIG. 2 but differs therefrom in that instead of using vanes to control the movement of the missile relative to the guiding light beam path it uses a plurality of jets 28, 28, 28, 28 each one corresponding to a similarly located vane 13'. The several jets are controlled by valves 29, 29, 29, 29 which are activated by the electromagnet 12' which correspond to the electromagnets 12 of FIG. 1. In response to the action of the particular light sensors the movement of the valves 29 act to permit fluid or gas flow from a supply source 30 to pass out through the appropriate jet opening 28 and thus act to apply transverse thrust to the missile to bring it it back to the correct position in the light guidance path to the target. Located in the longitudinally opening 11 near the outer end of the missile 10' is a reticle 40' to act as a sighting device for the light beam as it impinges on the target 19'.

In FIG. 5 a schematic control system for the operation of the missile system of FIG. 2 is disclosed although parts of this system also apply to the bombing system of the FIG. 1 disclosure. In said FIG. 5 numerals 14' refer to the light sensors, numerals 27 refer to the heat sensors, numerals 13' and 28 refer to the vane and jet control elements, the legend T, B, R, L refers to the top, bottom, right and left sensors and thrust controls and the legends TA, RA, BA, LA refers to the amplifiers corresponding to the T, R, B, L sensors and thrust control.

With the above explanation in mind the operation of the disclosed structure will be readily understood.

The group of light sensors 14' are connected to the left side bank of contacts 31 of switching means 32 and heat sensors 27 are connected to the right side bank of contacts 34. Pivoted arm 35 is of insulating material and has slidable contacts on one side thereof to make contact with one or the other of the banks of contacts and instantaneously transfer the electric control signals from the light sensors to the heat sensors by means of a relay 41 controlled by the heat sensors 27 when the missile nears its target and takes over the control of the steering means for the missile.

If desired means may be provided to actuate relay 41, by means of a conventional radio control, to shift switch 32 under the control of the missile operator.

The central switch position of arm 35 does not make contact with either group of contacts 31 or 34.

An electric connection is thus made between the sliding contacts on the arm 35 and the corresponding amplifiers whose output is connected to the proper vane control or jet control for the guiding means for the missile.

The wiring is only partly shown to avoid confusing the drawing. The several amplifiers are controlled by means of a timer 36 operating a rod 37 to increase the amplification of the several amplifiers equally as the missile or bomb gets further away from the controlling light source to compensate for the weakening of the light beam as it gets further away from its launching base.

The operation of this form of the device appears obvious from the foregoing disclosure and need not be separately described.

The form of bomb or missile device disclosed in FIGS. **6** and **7** is especially intended to facilitate the shift in bomb or missile construction in present day use to that disclosed in the prior forms of bombs and missiles described in this application. In the modified form here disclosed there is no need to change any of the basic bomb or missile structure of the known prior art sinc all that is needed to transform the present type bomb or missile structures to my prior disclosed devices is the attachment of a very simple unit designated **41** thereto. Unit **41** comprises a simple elongated hollow housing having a light opening **44** therein similar in function and prupose to the light openings **11, 11'**, in the bomb or missile previously described in this application.

This housing is provided at its rear end with a plurality of light sensor devices **14''**, four in number as in the other forms described, and corresponding in structure and function to the light sensors therein described. These light sensors also are spaced corresponding to the positions labeled T, R, B, and L and function in every way as do the other light sensors so labeled in relation to their action in response to action by the light beam **9'**.

This unit **41** can readily be attached to the housing **10'** of the bomb or missile by means of fastening means such as by screws **45** or by strap means of conventional type, not shown, or it may be formed as an integral part of the bomb or missile housing. The unit **41** has straight sides **46** which help to stabilize the missile in flight. If it should be found that the use of such a unit **41** on the bomb or missile upsets the balance or stabilization thereof in flight it would be a simple and inexpensive matter to provide another such unit **42** oppositely of unit **41** or even two more such units **43, 43** as shown in FIG. **7**. Of course the added units **42, 43, 43,** if used, would have the hollow opening therein but would not have any light sensors at the rear end thereof.

All these attabhable units **41, 42, 43, 43,** could be formed as a single readily attachable unit to be used as a conversion kit to readily transform the present day aerial bomb or missile structure, with practically no alteration whatsoever, to aerial bomb and missile structures of my previously disclosed light beam guidance type.

Since in the FIGS. **6** and **7** modification, the opening for the passage of the guiding light beam is transversely displaced from the central axis of the missile, it is possible to use a convention power driving means for the missile comprising a suitable jet or rocket power plant **47** located at the rear end of the missile and located on the central axis thereof.

In using the form of bomb or missile disclosed in FIGS. **6** and **7** herein the position of the light beam emitter of the prior launching base structures would be slightly shifted to line up with the light opening **44** and the light beam from the light emitter would not hit the target at the precise center point thereof. However the light ray path would hit the target at a point only slightly displaced from the center point of the target. To be precise the difference would only be the difference between the center line of the bomb or missile and the center line of the light beam **44** which would at most not exceed about a foot and would be closed enough in any case.

Thus it is apparent that there has been shown and described novel means for guiding an aerial bomb or missile by means of a movable single concentrated parallel beam of light rays directed at a target from the initial release of the bomb or missile until it reaches its target. Many modifications, alterations and changes in the details of the specific embodiments of the invention shown and described herein will be apparent to those skilled in the art. All such modifications, alterations and changes which do not depart from the spirit and scope of the present invention are deemed to be covered by the invention which is limited only by the claims which follow:

What is claimed is:

1. An optical light beam rider guidance system for guiding a movable device, such as an aerial bomb or missile having an opening therein, from a launching base to a target, wherein said base comprises; light beam generating means for producing a single concentrated beam of parallel light which passes through the opening in the movable device, means on said movable device comprising a plurality of light sensors which cooperate with said light beam and lock the movements of said movable device to the movements of said light beam by means on the movable device connecting the output of said sensors to deflector means forming a part of the movable device to deflect said movable device laterally of said light beam path as required to keep said movable device travelling to said target on the said single light beam path, regardless of the movement of the target for the movable device, from the launching base to the said target.

2. The system of claim **1** in which said light sensors are arranged circumferentially around said opening through which the said single light beam passes on its way from the launching base to its target.

3. The system of claim **2** in which the launching base has an optical device for sighting the target.

4. The system of claim **2** in which said light beam comprises a laser beam.

5. The system of claim **2** in which said light beam comprises an infrared beam of invisible light.

6. The system of claim **2** in which said beam comprises a light beam of a narrow restricted range of wavelengths.

7. The system of claim **2** in which said light sensors cooperate with the light beam to cause transverse movement of the movable device by means of thrust devices located at a position centrally of the movable device at the outer surface thereof.

8. The system of claim **7** in which the light sensors produce a stronger corrective force to the thrust devices as the light beam moves further from the central path of the explosive device.

9. The system of claim **7** in which the path of the light to the target through said opening in the movable device is quickly adjusted by means of a single stick hydraulic control for quickly shifting the housing and the light beam emitted therefrom.

10. The system of claim **9,** wherein the speed of movement of the light path to correct for movement of the target during the flight of the movable device thereto is correlated with and limited by the speed at which the sensors and thrust devices can control the movement of the explosive device.

11. The system of claim 3 in which said light sensors are arranged circumferentially around said opening in the rear end of the movable device through which the said single light beam passes on its way from the launching base to the target.

12. The system of claim 3 in which said sensors are arranged circumferentially around the rear end of a tubular housing attachment for mounting the attachment to a more or less convential bomb or missile to convert it for operation in a light guidance system as described herein.

13. The system of claim 3 in which said sensors are arranged circumferentially around said opening through the movable device on the outer perifery o the rear surface thereof.

14. The system of claim 3 in which the sensors are arranged circumferentially around said opening which passes longitudinally through the movable device on the longitudinal axis thereof.

15. A method of guiding a movable device from a launching base to a target comprising the steps of directing a single, concentrated, small diameter parallel beam of light to a target, passing said beam of light through a longitudinal opening in said movable device, adjusting the position of said beam of light so that the light thereof impinges on said target, releasing the said movable device from the launching base and directing its travel to said target by keeping the movable device travelling on the said light beam path until the movable device reaches the said target regardless of movements of the target after the movable device was released from its launching base or movements of the movable device due to weather conditions such as changes in wind direction.

16. A method of guiding a movable device from a launching base to a target as set forth in claim 15 comprising the further step of keeping the beam of light on the target regardless of any movement of the target during the travel of the movable device by shifting the position of the light beam to keep it on said target as the target changes position.

17. A method of guiding a movable device from a launching base to a target as set forth in claim 15 comprising the further step of shifting from the light beam control for guiding the said movable device when the said movable device nears its target to another form of guidance control which is more effective when the said movable device nears its target.

18. A movable device, comprising an elongated generally cylindrical member, having a longitudinal opening therethrough for coopera;tion with a light beam the entire area of which passes through this opening to guide the said movable device to a target, a plurality of light sensors located on said movable device at the periphery of the opening therein, a plurality of thrust devices corresponding to the respective sensors and located on the surface of the said movable device centrally thereof and means connecting the respective sensors and thrust devices in accordance with the deviation of the said movable device from its correct path to bring it automatically into the correct path position regardless of the changing position of the target as the said movable device travels from its launching base to its target.

19. A movable device as claimed in claim 18 wherein the longitudinal opening in the movable device is in a tubular member readily attachable to the outer surface of the explosive device.

20. A movable device as claimed in claim 18 wherein the longitudinal opening in the movable device is along the central axis of the explosive device.

21. A movable device as claimed in claim 18 having a group of heat sensors located around the opening in the nose of the movable device to guide the explosive device to the target only when the movable device is close thereto.

22. A movable device as claimed in claim 18 wherein a timer is provided to automatically increase the volume of the amplifiers as the movable device gets further away from its launching base on its way to the target to compensate for the decrease in activity of the sensors due to their increased distance from the light source.

23. A movable device as claimed in claim 21 wherein an automatic changeover means is provided to shift the guidance control means from the light sensors to the heat sensors as the movable device approaches its target.

24. A movable device as claimed in claim 18 wherein retroreflecting material is applied to the rear end of the movable device on the area between the light sensors to enable the operator at the launching base to see where the movable device is going by the light reflected back to him.

25. A movable device as claimed in claim 18 wherein a plurality of spaced jets are used to apply the desired transverse thrust to the movable device to bring it back into the correct light ray path.

26. A movable device as claimed in claim 20 wherein a plurality of spaced pivoted vanes are used to apply the desired transverse thrust.

27. A movable device as claimed in claim 18 wherein a plurality of infrared laser beam detectors are spaced around the opening in the front part of the movable device to detect infrared laser beam light reflected from the target when an infrared laser beam is used for the light beam guiding path.

28. A movable device as claimed in claim 21 wherein heat shields are positioned around the light and heat sensors to prevent unwanted heat interfering with their proper operation.

29. A movable device as claimed in claim 18 wherein stabilizing fins extend longitudinally of the rear surface of the movable device.

30. A movable device as claimed in claim 20 wherein a reticle sighting means is provided in the longitudinal opening near the forward end thereof.

31. The system of claim 1 wherein the launching base is supported in a substantially stationary satellite in space and the aerial bomb has a power plant therein for driving the aerial bomb at an accelerated speed and a timer for automatically starting the operation of the power plant a few seconds after the bomb has been dropped from the substantially stationary launching base.

32. A movable device as claimed in claim 19 in which the outer surface of the movable device has an additional plurality of similarly shaped tubular outer housing members for forming a set of four symmetrically arranged housing members on the outer surfacr of the movable device to help stabilize the flight of the movable device.

33. A movable device as claimed in claim **19** wherein the movable device is a missile having a powerplant for driving the missile located at the rear portion of the missile and along the central longitudinal axis thereof.

34. A movable device as claimed in claim **18** wherein the longitudinal opening in the movable device is located on an axis spaced from the central axis of the devie and parallel to the central axis and comprises an integral part of the device.

35. A movable device as claimed in claim **18** wherein the light sensors are located within the longitudinal opening of the movable device at approximately the center of dynamic balance thereof.

36. A movable device as claimed in claim **35** wherein a reticle is provided in the central area of the longitudinal opening of the movable device.

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