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Inventor                 Jeffrey L. Cipolla

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MISSILE SUPPORT AND ALIGNMENT ASSEMBLY

TO ALL WHOM IT MAY CONCERN:

BE IT KNOWN THAT (1) JEFFREY L. CIPOLLA, citizen of the United States of America, employee of the United States Government, and resident of Newport, County of Newport, State of Rhode Island, has invented certain new and useful improvements entitled as set forth above, of which the following is a specification.

ROBERT W. GAUTHIER, ESQ.  
Reg. No. 35153  
Naval Undersea Warfare Center  
Division, Newport  
Newport, RI 02841-1708  
TEL: 401-832-4235  
FAX: 401-832-1231

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1 Navy Case No. 78450

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3 MISSILE SUPPORT AND ALIGNMENT ASSEMBLY

4  
5 STATEMENT OF GOVERNMENT INTEREST

6 The invention described herein may be manufactured and used  
7 by or for the Government of the United States of America for  
8 Governmental purposes without the payment of any royalties  
9 thereon or therefor.

10  
11 BACKGROUND OF THE INVENTION

12 (1) Field of the Invention

13 The invention relates to missile launch systems and is  
14 directed more particularly to a missile support and alignment  
15 assembly for use on a moving vehicle, such as a submarine, having  
16 a fixed missile launch tube.

17 (2) Description of the Prior Art

18 Submarines are provided with fixed launch tubes for  
19 torpedoes and other missiles and ordnance. The tubes penetrate  
20 the pressure hull of the vessel. The launch tubes are arranged  
21 in a manner consistent with safety, the architecture of the  
22 vessel, and watertight integrity. Proximate the tubes is  
23 disposed an arrangement of shelf or frame-like structures for  
24 storage of the missiles and/or other ordnance, and a handling  
25 system for selecting a weapon, aligning the selected weapon with  
26 a selected launch tube, and for feeding the selected weapon into  
27 the selected launch tube.



1 missile support with the fixed missile launch tube, such that the  
2 missile may be pushed into the launch tube.

3 With the above and other objects in view, as will  
4 hereinafter appear, a feature of the present invention is the  
5 provision of a missile support assembly for use on a vehicle  
6 having a fixed missile launch tube, the assembly comprising a  
7 loading tray for supporting a missile, a storage structure for  
8 supporting the loading tray, and mounts resiliently connecting  
9 the storage structure to the vehicle.

10 In accordance with a further feature of the invention, there  
11 is provided a missile alignment assembly for use on a vehicle  
12 having a fixed missile launch tube, and in conjunction with a  
13 missile support assembly resiliently mounted on the vehicle, the  
14 alignment assembly comprising indicator means on the launch tube,  
15 a missile retaining tray mounted on the support assembly, at  
16 least one sensor on the missile retaining tray for reading a  
17 position of the indicator means, the sensor being adapted to send  
18 a signal indicative of the position of the tray, and thereby a  
19 missile retained by the tray, relative to the indicator means,  
20 and thereby the launch tube, a control device adapted to receive  
21 the sensor signals and compute movement of the tray necessary to  
22 align the missile with the launch tube, the control device being  
23 operative to send corrective signals, and alignment means mounted  
24 on the missile support assembly for receiving the corrective  
25 signals from the control device and operative in response thereto  
26 to move the tray widthwise of the launch tube to bring the  
27 missile on the tray into alignment with the launch tube.

1           The above and other features of the invention, including  
2 various novel details of construction and combinations of parts,  
3 will now be more particularly described with reference to the  
4 accompanying drawings and pointed out in the claims. It will be  
5 understood that the particular device embodying the invention is  
6 shown by way of illustration only and not as a limitation of the  
7 invention. The principles and features of this invention may be  
8 employed in various and numerous embodiments without departing  
9 from the scope of the invention.

10  
11                                   BRIEF DESCRIPTION OF THE DRAWINGS

12           Reference is made to the accompanying drawings in which is  
13 shown an illustrative embodiment of the invention, from which its  
14 novel features and advantages will be apparent, wherein  
15 corresponding reference characters indicate corresponding parts  
16 throughout the several views of the drawings and wherein:

17           FIG. 1 is a diagrammatic perspective view of one form of a  
18 missile support assembly illustrative of an embodiment of the  
19 invention; and

20           FIG. 2 is similar to FIG. 1, but illustrative of an  
21 alignment assembly mounted on the support assembly of FIG. 1.

22  
23                                   DESCRIPTION OF THE PREFERRED EMBODIMENT

24           Referring to FIG. 1, it will be seen that a preferred  
25 storage structure assembly 20 includes a loading tray 22 for  
26 supporting a missile M for alignment with a launch tube T. The  
27 tray 22 is supported by a frame structure 24 which is resiliently  
28 connected to a submarine, or other vehicle S, by mounts 26.

1           Referring to FIG. 2, it will be seen that a preferred  
2 alignment assembly 28 includes indicator means 30 on launch tube  
3 T and tray 22, and sensor means 32 on tray 22. Each sensor means  
4 32 is adapted to read at least one target indicator means 30 and  
5 to send a signal indicative of the position of the indicator  
6 means relative to the sensor means, and thereby the position of  
7 launch tube T relative to missile M.

8           The indicator means 30 may be in the form of markings or  
9 structure, such as fins or pins, or the like, on the launch tube  
10 T and, optionally, on tray 22, or active optical or  
11 electromagnetic emitters, such as light beam emitters, or the  
12 like, on the launch tube and/or tray. The sensor means 32 are  
13 adapted to read the markings or target structure, or a beam  
14 emitted by a beam emitter.

15           The alignment assembly 28 further includes a control device  
16 34 which is adapted to receive signals from the sensors 32 and  
17 compute or otherwise indicate movement of tray 22 necessary to  
18 align missile M with launch tube T. Further included in  
19 alignment assembly 28 are alignment motors 36 mounted on frame  
20 structure 24 for moving tray 22 to align missile M with launch  
21 tube T. The alignment motors 36 may be configured to receive  
22 corrective signals directly from control device 34 and in  
23 response thereto move the tray as appropriate to align missile M  
24 with launch tube T. Alternatively, control device 34 may provide  
25 an indication to a human operator who performs final alignment of  
26 missile M and tube T by manual control of alignment motors 36.

27           In operation, when it is desired to initiate a missile  
28 launch, the alignment assembly 28 is energized. The sensors 32

1 signal control device 34 as to the position of tube T, relative  
2 to missile M. The control device 34 computes movement of tray 22  
3 required to align missile and tray and sends signals to alignment  
4 motors 36 instructing the required movements. The alignment  
5 motors 36 operate to move tray 22 to bring the missile M into  
6 alignment with the launch tube T. A ram means (not shown), well  
7 known in the art, moves the missile axially into the launch tube.  
8 The alignment assembly 28 operates continuously from energization  
9 to launch tube loading to maintain proper alignment between  
10 missile M and launch tube T.

11 Alternatively, control device 34 provides a continuous  
12 indication of the required movements to a human operator. The  
13 operator manually controls alignment motors 36 to align missile M  
14 and launch tube T.

15 There is thus provided a missile support assembly which is  
16 resiliently mounted in a submarine or other vehicle, and an  
17 alignment assembly operative to align a missile resting on the  
18 support assembly with a launch tube.

19 It will be understood that many additional changes in the  
20 details, materials, steps and arrangement of parts, which have  
21 been herein described and illustrated in order to explain the  
22 nature of the invention, may be made by those skilled in the art  
23 within the principles and scope of the invention;

24 For example, while in the above description  
25 the use of the assembly described herein is set forth with regard  
26 to submarines, and while it is contemplated that the assembly  
27 will find substantial use in submarines, it will be apparent that  
28 the invention has applications in other marine vehicles, air



1 transport vehicles, and in land-based vehicles, such as railroad  
2 cars having launch tubes mounted thereon, or where alignment  
3 between separately supported structures is critical and the  
4 alignment is subject to movement of the structures relative to  
5 one another.

2  
3 MISSILE SUPPORT AND ALIGNMENT ASSEMBLY

4  
5 ABSTRACT OF THE DISCLOSURE

6 A missile support and alignment assembly for use on a moving  
7 vehicle having a fixed missile launch tube mounted thereon. The  
8 assembly comprises a missile support assembly including (i) a  
9 loading tray for supporting a missile, (ii) a storage structure  
10 for supporting the loading tray, and (iii) mounts resiliently  
11 connecting the storage structure to the vehicle. The missile  
12 support and alignment assembly further comprises an alignment  
13 assembly including (i) indicator means on the launch tube, (ii) a  
14 sensor on the tray for reading a position of the indicator means,  
15 the sensor being adapted to send a signal indicative of position  
16 of the tray, and thereby a missile on the tray, relative to the  
17 indicator means, and thereby the launch tube, (iii) a control  
18 device adapted to receive the sensor signals and compute movement  
19 of the tray necessary to align the missile with the launch tube,  
20 the control device being adapted to send corrective signals, and  
21 (iv) alignment motors mounted on the storage structure for  
22 receiving the control device signals and for moving the tray  
23 relative to the launch tube to bring the missile in the tray into  
24 alignment with the launch tube.

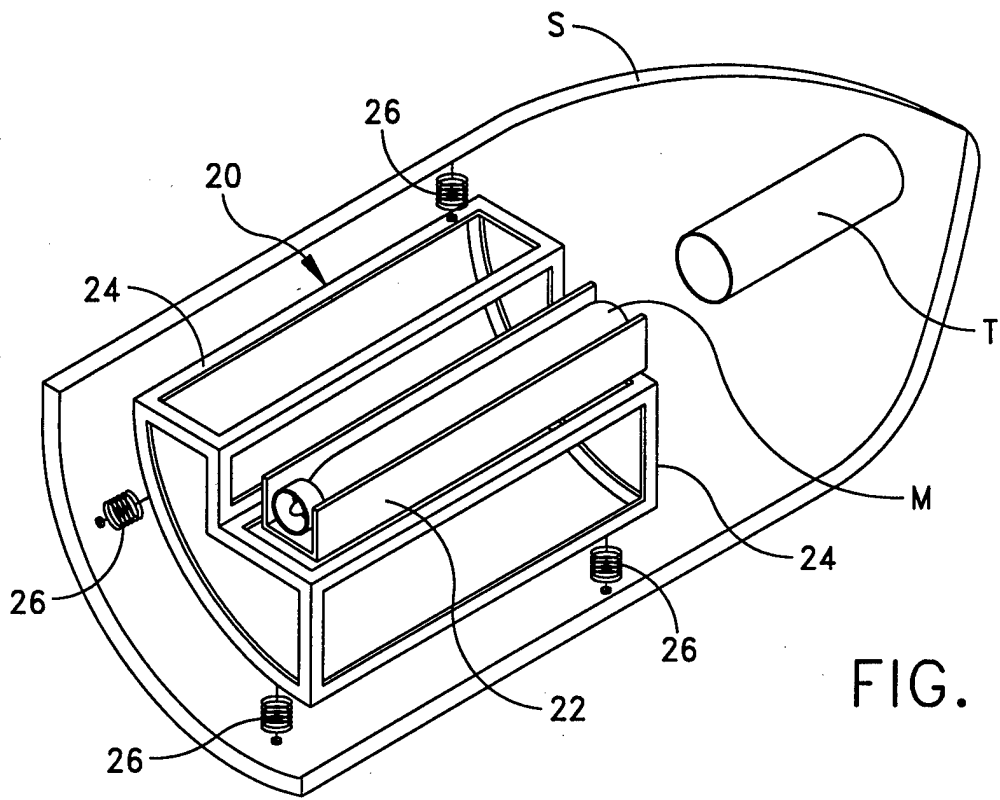


FIG. 1

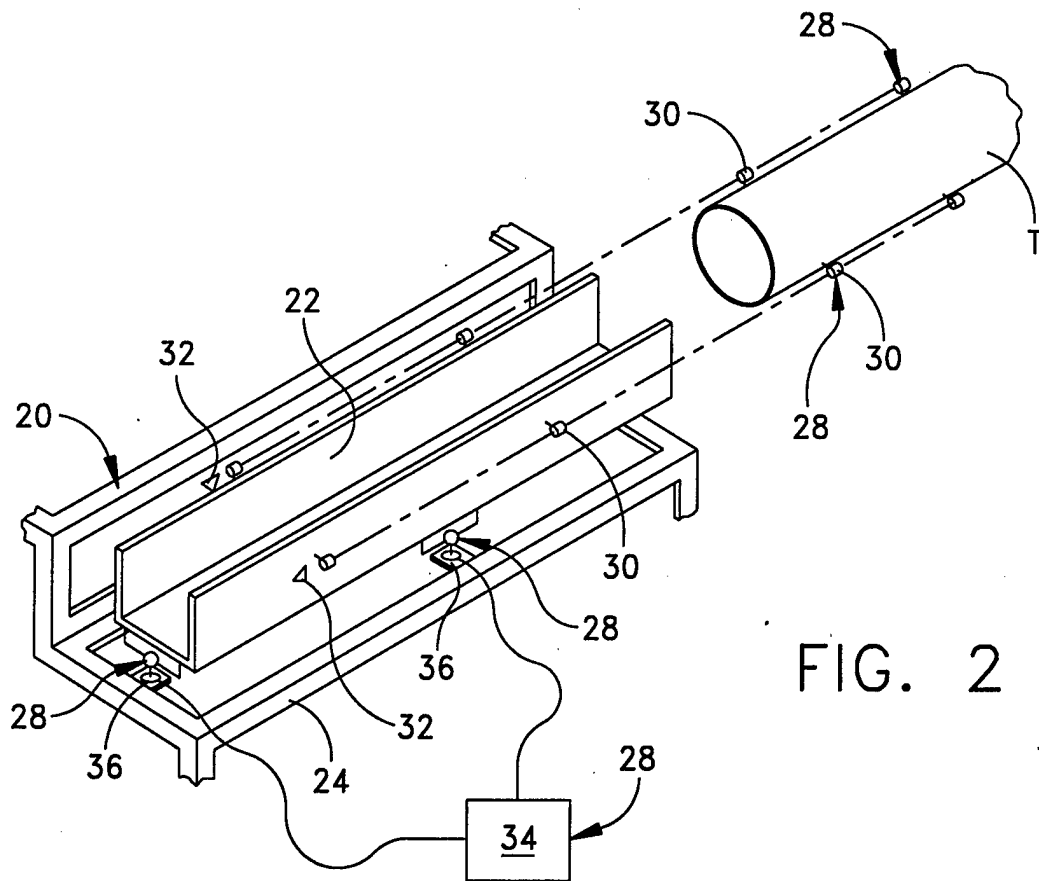


FIG. 2