July 18, 1967 H. W. ALDRIN ET AL 3,331,279

LAUNCHING ASSEMBLAGE FOR ROCKET MISSILES

Filed May 4, 1965

4 Sheets-Sheet 1

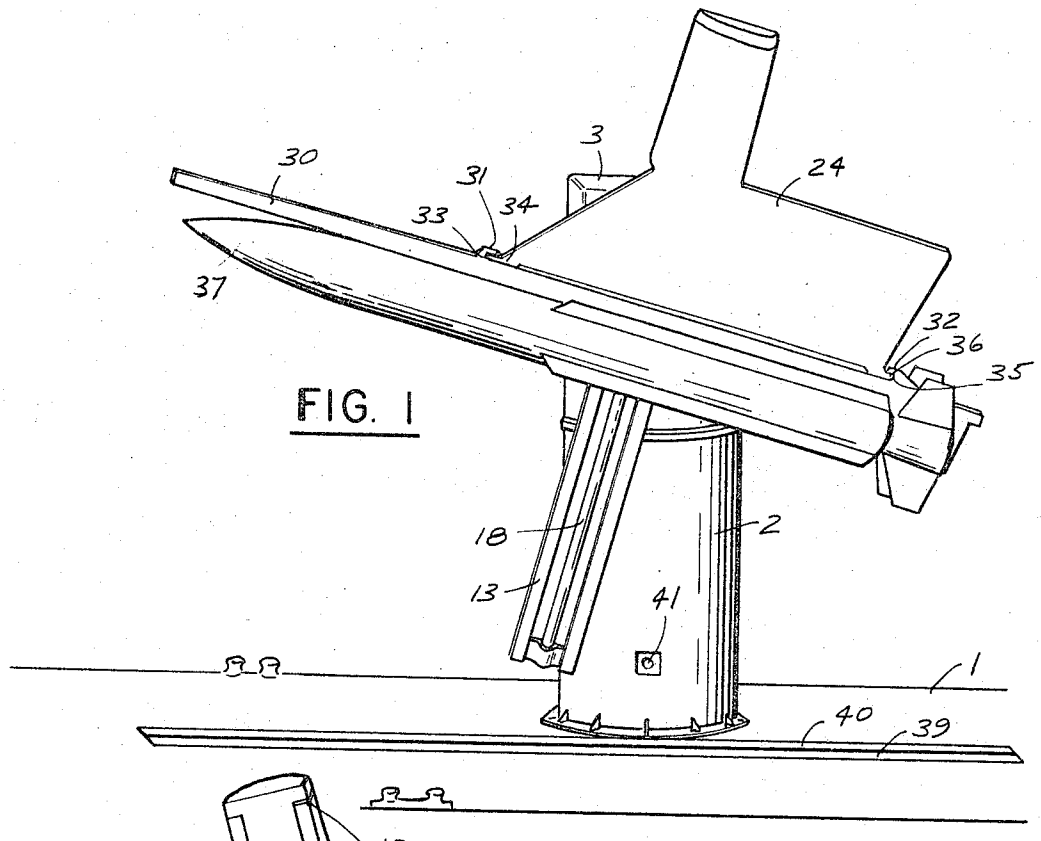

FIG. 1

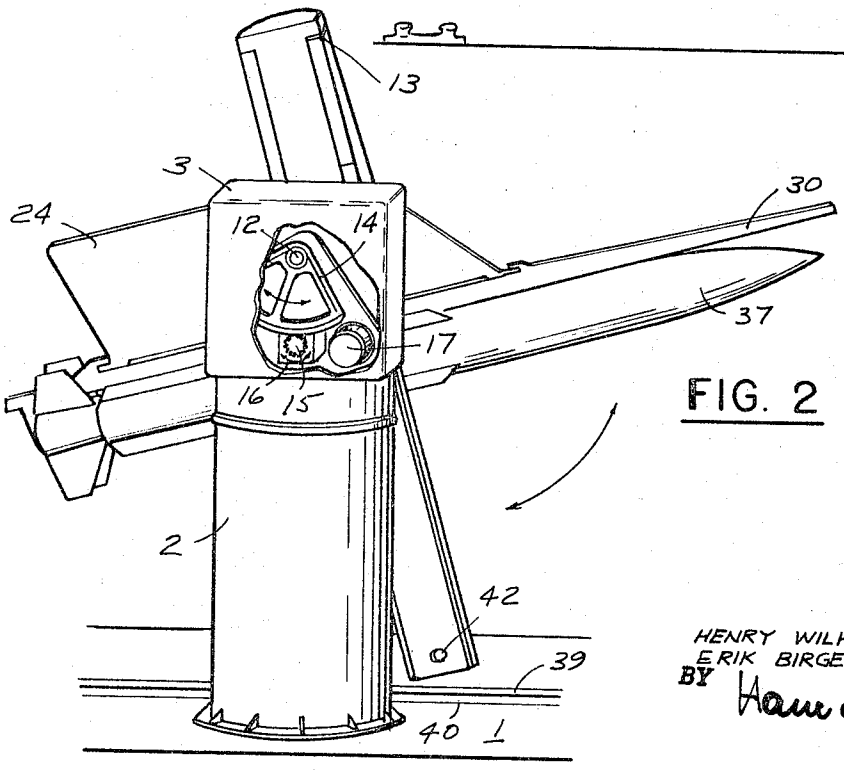

FIG. 2

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FIG. 3

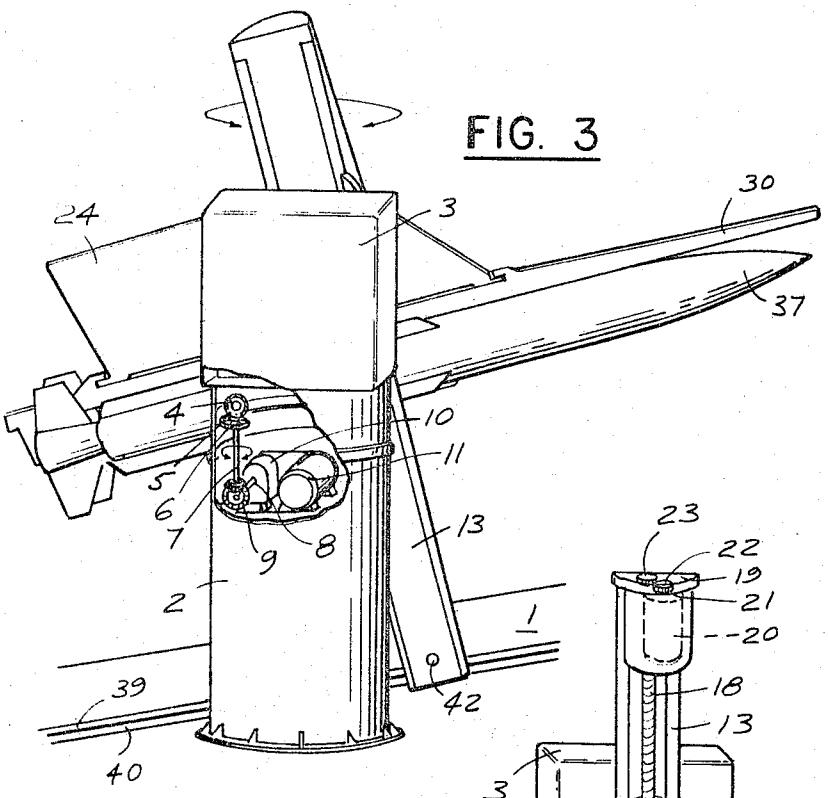
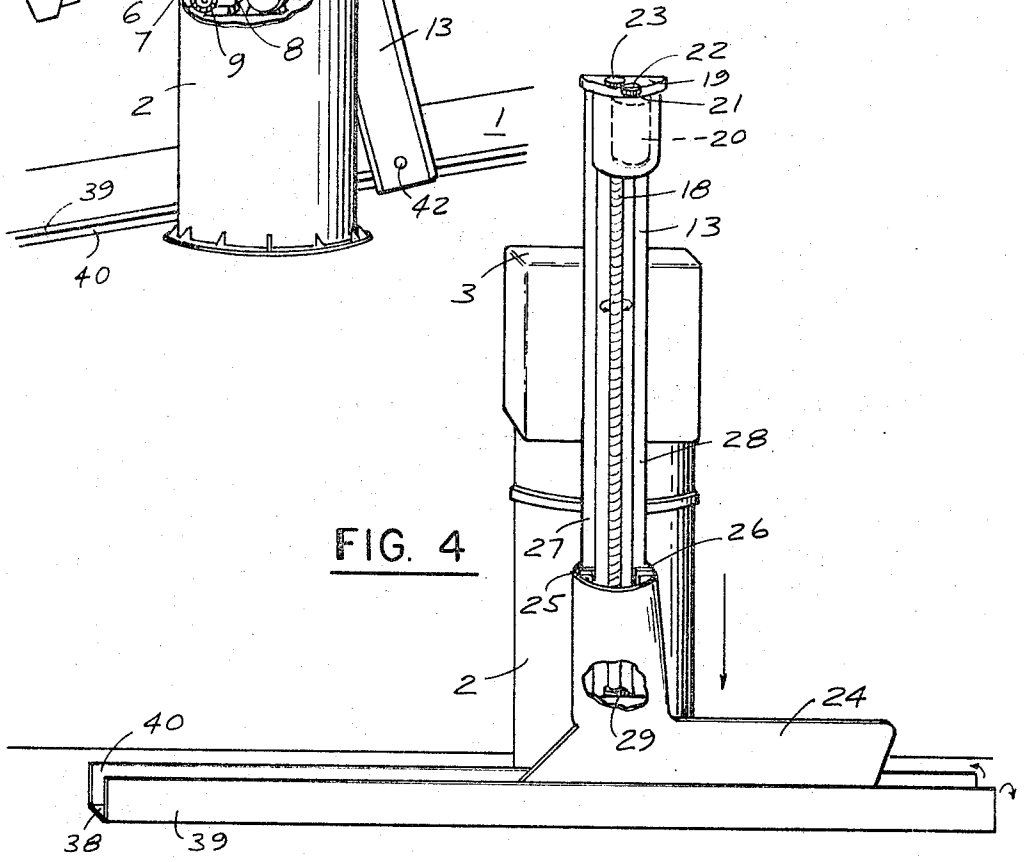


FIG. 4



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LAUNCHING ASSEMBLAGE FOR ROCKET MISSILES

Filed May 4, 1965 4 Sheets-Sheet 3

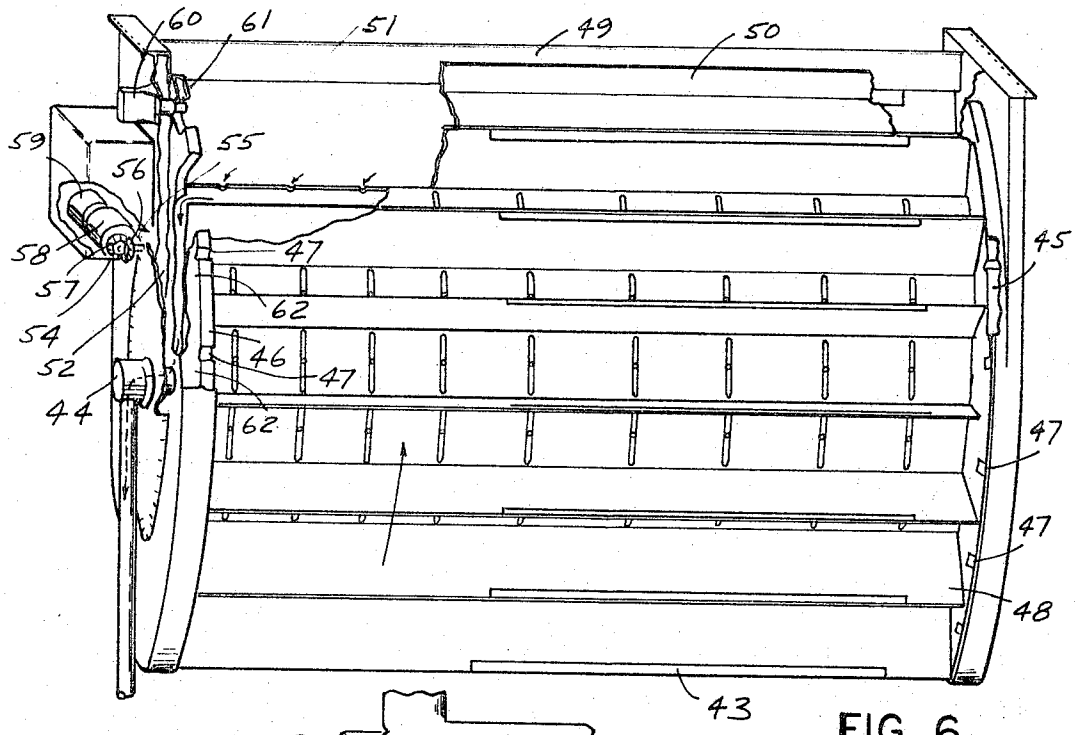

FIG. 6

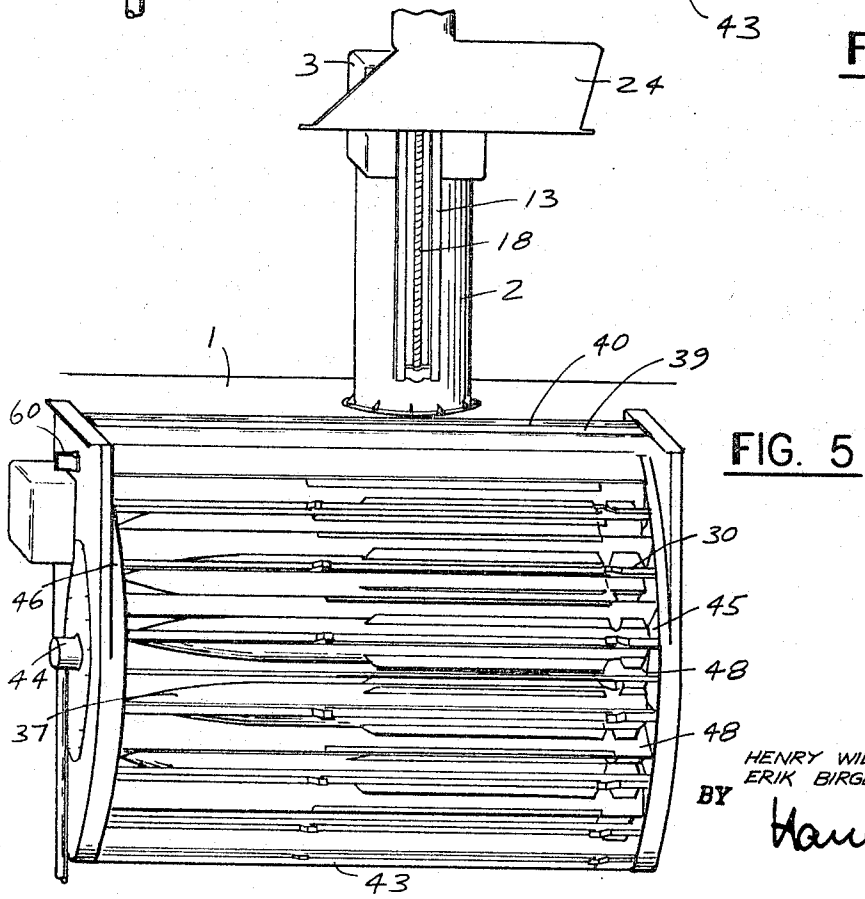

FIG. 5

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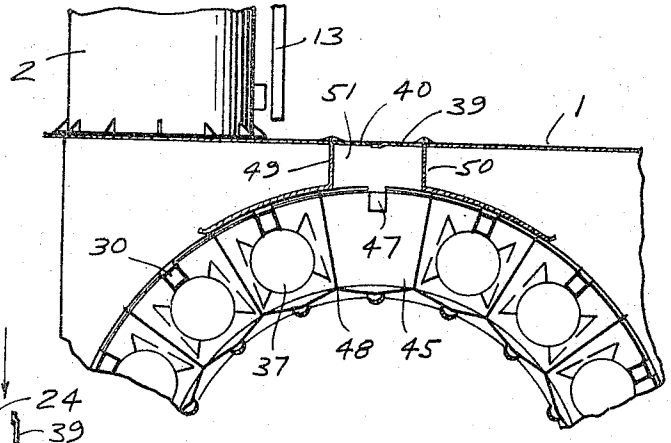

FIG. 7

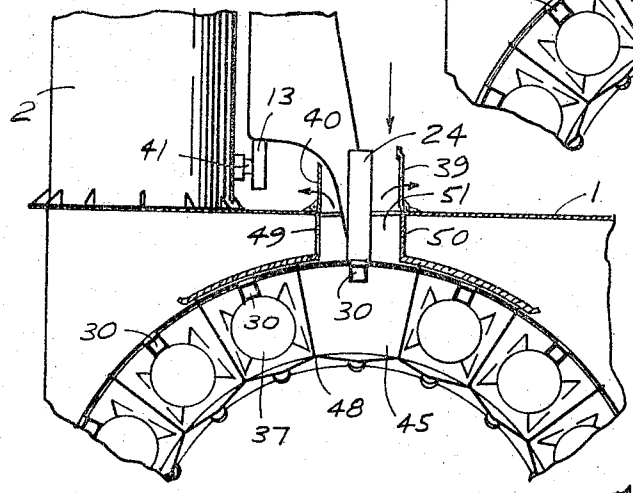

FIG. 8

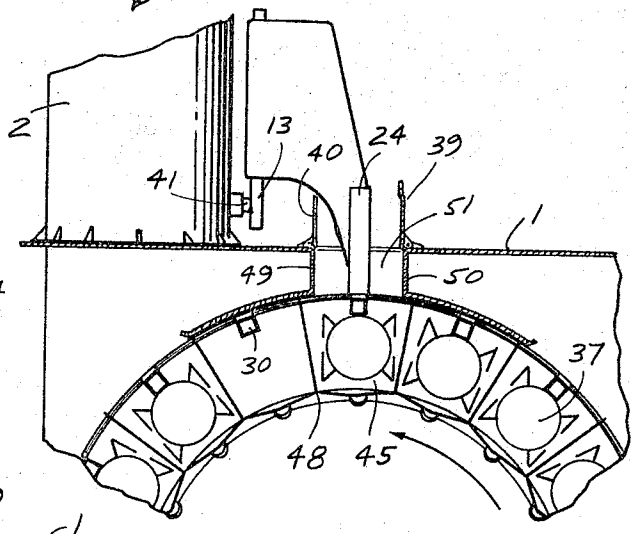

FIG. 9

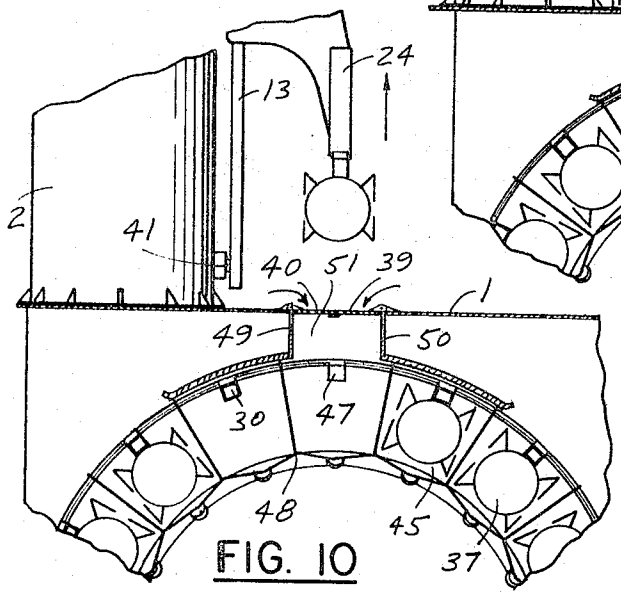

FIG. 10

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LAUNCHING ASSEMBLAGE FOR ROCKET MISSILES

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Claims priority, application Sweden, May 6, 1964, 5,617/64
15 Claims. (Cl. 89—1.802)

The present invention relates to a launching assemblage for firing missiles of the rocket type. There are known launching assemblages including a launching stand to which is secured a launching rail. The rocket to be fired is releasably suspended from the rail, generally parallel thereto. The conventional practice of mounting a rocket to be fired on the rail is lengthwise of the rail, generally from the rear end thereof. Aiming of the rocket is effected by traversing and elevating the rail and the stand.

To effect mounting of a rocket on the rail from the rear end of the latter and lengthwise therewith, it should be possible, or at least convenient for practical purposes, to place the rail in a substantially horizontal position. When the launching assemblage is installed on the deck of a ship, such as small naval craft as is frequently the case, the rockets are generally stored below deck and the customary practice is to turn the rail so that it is substantially at right angle with the deck. The rocket is then lengthwise applied to the rail from below deck.

In modern rocketry, there is a tendency for the rockets to become longer and longer and this creates the difficulty that there is not sufficient space available for a rocket to stand upright between the top deck mounting the stand and the rail and a lower deck on which the rockets are stored. In particular, it has been found difficult to find space for loading a rocket from the rear end of the rail in lengthwise relationship therewith.

It is a broad object of the invention to provide a novel and improved launching assemblage of the general kind above referred to which permits a convenient loading of the rocket on a launching rail attached to a launching stand even though the space required for such loading is very limited.

A more specific object of the invention is to provide a novel and improved launching assemblage of the general kind above referred to which permits loading of a rocket on a launching rail already mounted on the launching stand, and also loading of a rocket and a launching rail as a unit in a direction which is transverse of the rocket and the rail in reference to the stand. Such transverse loading has the advantage that the heretofore necessary space behind the launching stand, which as stated before, is at least equal in length to the length of the rail and the rocket, is not required but that a comparatively small sidewise space is sufficient.

According ot the invention, the aforepointed out objects, features and advantages and other objects, features and advantages which will be pointed out hereinafter are attained by providing an upright stand, such as a column stationarily mounted on a base, such as the deck of a ship and supporting on its upper end a support member rotatable about a perpendicular axis. The support member, in turn, mounts a mounting bar pivotal about an axis transverse of the rotational axis of the support member and supporting a carrier head which is slidable along the bar. The head is arranged to receive or to have fixedly secured thereto a launching rail for supporting a rocket to be fired. The length of the bar and the shape of the head are such that the head can be lowered so that the rail is below the base of the upright column, that is, below the deck. In such a lower position of the head, a rocket to be

fired is secured to a rail mounted on the head, or the rail may be pre-mounted on the rocket in which the rail and the rocket are secured as a unit to the head. The head is then raised again and placed in the appropriate position for firing the rocket.

In the accompanying drawing, a preferred embodiment of the invention is shown by way of illustration and not by way of limitation.

In the drawing:

FIG. 1 is an elevational side view of a launching assemblage according to the invention with a rocket in position ready for firing;

FIG. 2 is an elevational view similar to FIG. 1, but showing the launching assemblage from the opposite side, partly broken open to show the elevating mechanism of the assemblage;

FIG. 3 is an elevational view similar to FIG. 2, but broken open to show the traversing mechanism of the assemblage;

FIG. 4 is an elevational view showing the head carrying an empty rail lowered for loading with a rocket;

FIG. 5 is an elevational view showing the launching stand with the components mounted thereon and the supply magazine from which rockets and launching rails are supplied to the stand;

FIG. 6 is a detailed view of the supply magazine partly broken open; and

FIGS. 7 through 10 show a loading operation in several stages.

Referring now to the figures in detail, the exemplified launching assemblage comprises an upright stand, such as a column **2** stationarily mounted on a base **1** which may be visualized as being part of the deck of a naval craft. Column **2** supports a member **3** which is rotatable about a perpendicular axis in reference to deck **1**. To facilitate turning of member **3**, suitable bearings, such as ball bearings **4**, may be provided. As can best be seen in FIG. 3, column **2** is hollow and constitutes a housing in which is mounted the traversing mechanism of the assemblage. This mechanism comprises a toothed arc **5** on member **3** which is also hollow, coacting with a gear **6** seated on one end of a shaft **7**. The other end of the shaft mounts a bevel gear **8** in mesh with a gear **9** of a gear transmission **10** driven by a motor **11**.

As is shown in FIG. 2, support member **3** mounts a preferably flexible mounting bar **13** which is seated on a pivot shaft **12** extending transversely of the rotational axis of member **3**. Pivot shaft **12** seats a gear segment **14** in mesh with a gear **15** of a gear transmission **16** driven by a motor **17**. As is evident, pivoting of gear segment **14** by motor **17** will move bar **13** to any selected angular position in reference to column **2**. The angular position of bar **13** controls the elevation of a rocket to be fired as will appear from the subsequent description.

As can best be seen in FIG. 1, bar **13** mounts a lengthwise screw spindle **18** which is rotatably supported at opposite ends of the bar. Spindle **18** at the upper end of bar **13** is supported in a flange **19** laterally extending from the bar proper (FIG. 4). The flange also supports a drive mechanism **20** including a motor driving a shaft **21** mounting a gear **22**. The gear is in mesh with a second gear **23** fixedly secured to the upper end of spindle **18**. The bar mounts a carrier head which is slidable along the bar and is guided by suitable guide means shown as two guide members **25** and **26** engaging turned-over flanges **27** and **28** respectively on the bar. The carrier head has fixedly secured thereto a screw nut **29** through which spindle **18** is extended. The threads on the spindle and on the nut are in mesh so that a rotation of drive mechanism **20** will cause lengthwise displacement of head **24** along the bar via shaft **21**, gears **22** and **23** and spindle **18**.

The directional movement of the head can be conveniently controlled by reversing the rotational direction of mechanism 20, or by suitable reversing means.

The lower end of head 24 which is generally plate-shaped, serves to receive a launching rail 30. The rail may be fixedly secured to head 24, but it is preferably releasably mounted by fastening means 31 and 32. Fastening means 31 comprise a guide track 33 on rail 30 and a mounting rail or tongue 34 on head 24. Fastening means 32 similarly comprise a guide track 35 on rail 30 and a mounting rail or tongue 36 on head 24. The guide tracks and mounting rails are slidably engageable with each other and extend transversely to the lengthwise planes of the head and the rail so that the rail may be attached to head 24 and released therefrom by moving the rail sidewise in reference to head 24, or in other words, in the direction of the pivot axis of bar 13. The two guide tracks 33 and 35 are preferably formed in raised portions of the launching rail. They are shown as having a generally U-shaped cross section and facing in opposite directions, thereby preventing a lengthwise displacement of the mounted launching rail in reference to head 24.

It is, of course, possible and within the scope of the invention to provide the mounting rails or tongues on launching rail 30 and the guide tracks on head 24. It is further possible and within the scope of the invention to turn the fastening means so that the launching rail is attached to and released from the head by a movement substantially parallel to the plane of bar 13 rather than transversely in reference thereto. It is merely essential that mounting of the rail on the head and release therefrom are effected in a direction transverse of the length of the launching rail rather than in the lengthwise direction thereof as heretofore conventional.

To secure a mounted launching rail not only in its lengthwise position but also transversely, suitable and conventional additional fastening means may be provided, such as snap fastener type devices.

Launching rail 30 supports a rocket 37. This rocket is fastened to the launching rail before the same is mounted on carrier head 24. The mounting of the rocket on the rail should be visualized as being effected by suitable and conventional fastening means. A widely used conventional fastening means suitable for the purpose comprises two guide grooves in the lower side of the launching rail which are engaged by headed pins extending from the body of the rocket.

Deck 1 on which the aforedescribed assemblage is mounted includes a generally rectangular opening 38. As can best be seen in FIG. 4, this opening can be closed by two hinged closure plates 39 and 34, the operation of which is controlled by means suitable and conventional for the purpose which do not constitute part of the invention. Opening 38 is so dimensioned and located that rail 30 and rocket 37 carried on head 24 can pass through the opening in either direction when bar 13 is placed in an up and down or perpendicular position. This position is shown in FIG. 4 and represents a 0 degree elevation and a 0 degree traverse.

Bar 13 may be locked in its up and down position by suitable retention means shown as a peg 41 and a hole 42 on column 2 and bar 13 respectively. When head 24 is lowered into the position in which a launching rail and a rocket supported by the head are below the level of deck 1, it coacts with a supply magazine mounted below deck. The magazine is shown as being of the rotary drum type. It comprises a rotary drum 43 rotatable about an axis 44 parallel to the plane of deck 1. The drum has end walls 45 and 46 and is divided by radially oriented partition walls 48 into a plurality of axially extending circumferentially spaced compartments. Each of the compartments serves to accommodate a launching rail 30 with a rocket 37 attached thereto. The rail-and-rocket units are held in position in the compartments by circumferentially spaced notches 47 in the periphery of end walls

45 and 46. These notches are engaged by the ends of the launching rails.

The opening 38 in deck 1 is framed below the deck by depending plates or walls 49 and 50 to form a chute 51 leading to the outer periphery of drum 43 as clearly shown in FIGS. 6 through 10.

To effect a step-by-step rotation of the drum, a peripherally toothed ring 52 is secured to the outside of end wall 46. The toothed ring is in mesh with a gear 54 secured to one end of a shaft 55. The other end of the shaft mounts a bevel gear 56 in mesh with a bevel gear 57 of a gear transmission 58 driven by a motor 59. To control a stepwise rotation of the drum, a retention device 60 is provided. This device is shown as comprising a lengthwise displaceable, preferably spring loaded pin or peg 61 engageable with suitably placed holes 62 in end wall 46. Holes 62 are so placed that turning of the drum through an angle corresponding to the spacing between two holes 62 will place one of the compartments in the drum in registry with chute 51.

The aforedescribed drive mechanism for the drum may also be mounted on end wall 45, or a drive mechanism may be provided at both end walls, similarly, retention device 60 may coact with one or the other end wall, or with both end walls.

The launching assemblage as hereinbefore described operates as follows:

Let it be assumed that rocket 37 suspended from rail 30 and aimed as shown in FIG. 1 has been fired and that it is now desired to reload the empty rail left on carrier head 24. For this purpose, the carrier head 24 is set for elevation 0 degree and traverse 0 degree and the retention device 41, 42 is operated to secure bar 13 and with it head 24 in that position. Drive mechanism 20 is now started to lower the carrier head with the empty rail thereon into a position in which the rail and part of the head are below the level of deck 1.

Referring now to FIG. 7, this figure shows an empty compartment in the drum in registry with chute 51. Head 24 when reaching its lowermost position will seat the empty launching rail thereon in the notches 47 in the empty compartment as it is shown in FIG. 8. The drum is now turned one step and such turning will cause the lowered launching rail 30 retained at its end by notches 47 to be detached from head 24 by sliding guide tracks 33 and 35 on the launching rail out of mounting rails 34 and 36 on the head. A further turning of the drum through one step will insert the guide tracks on the launching rail in the next compartment into the mounting rails on the carrier head as is shown in FIG. 9.

The carrier head with a new rail-and-rocket unit attached thereto can now be lifted as it is shown in FIG. 10. Finally, the carrier head is placed in the desired elevational and traverse position to ready the newly loaded rocket for firing.

The invention has been described hereinbefore in connection with a launching rail detachable from the carrier head and pre-mounted on a rocket, but the invention is also suitable for use with a carrier head with a launching rail fixedly attached thereto. However in such arrangement, the magazine cannot be placed sidewise of the carrier head but must be placed behind or in front of the same.

Instead of using a drum magazine, other suitable magazines may also be used. It is, for instance, possible and practical to use magazines of the transverse conveyor type placed on both sides of chute 51.

In the described and illustrated exemplification of the assemblage, only one carrier head 24 is provided, but it is, of course, possible to provide several carrier heads by giving pivot shaft 12 an adequate length.

While the invention has been described in detail with respect to a certain now preferred example and embodiment of the invention, it will be understood by those

skilled in the art, after understanding the invention, that various changes and modifications may be made without departing from the spirit and scope of the invention, and it is intended, therefore, to cover all such changes and modifications in the appended claims.

What is claimed is:

1. A launching device for rocket missiles, said device comprising a stationary platform, a support mounted on said platform rotatable about a perpendicular axis, a mounting bar supported by said support pivotal about an axis transverse of the rotational axis of the support member, a head member supported by said bar, means mounted on said bar for slidably mounting said head member along the length thereof for placing the head member in a selected position in reference to the bar, and a launching rail member for a rocket to be fired supported by said head member, the length of said bar and the shape of the head member being such that the launching rail is below the level of said platform when said mounting bar is pivoted into a substantially perpendicular position and the head member is moved into its lowermost position on the bar.

2. A launching device according to claim 1, wherein said support comprises a stationarily mounted stand and a rotary mounting member, said mounting member being rotatable about the perpendicular axis and supporting said mounting bar.

3. A launching device according to claim 1, wherein said launching rail member is fixedly mounted on said head member.

4. A launching device according to claim 1 and comprising fastening means on said head member and said launching rail member, said fastening means being slidably engageable with each other in a direction transverse of the length of said launching rail member.

5. A launching device according to claim 4, wherein said fastening means comprise means for blocking lengthwise displacement of the launching rail member in reference to the head member when the rail member is supported on the head member.

6. A launching device according to claim 4, wherein said fastening means comprise a pair of guide tracks on one of said members and a pair of mounting rails on the other of said member, said tracks and mounting rails being slidably engageable with each other and extending parallel to the pivot axis of said bar.

7. A launching device according to claim 6, wherein said guide tracks have a generally U-shaped cross section, the open sides of the tracks facing in opposite directions to prevent longitudinal displacement of the mounting rails engaged therewith.

8. A launching assemblage comprising, in combination, a substantially plane support base, an upright member stationarily mounted on said base, a support member rotatably supported on said upright member, the support member being rotatable about a perpendicular axis, a mounting bar supported on said support member pivotal about an axis transverse of the rotational axis of the support member, a head member supported by said bar, means mounted on said bar for slidably mounting said head member along the length thereof for placing the head member in a selected position in reference to the bar, and a launching rail member for a rocket to be launched supported by said head member, the length of said bar and the shape of the head member being such that at least part of the head member and the launching rail supported thereon are below the level of said plane support base when the mounting bar is pivoted into a substantially perpendicular position and the head member is placed in its lowermost position on the bar, said support base including a passage opening for passage of the launching rail.

9. An assemblage according to claim 8 and comprising closure means for closing said passage opening and uncovering the same for passage of a launching rail and a rocket supported by the head member.

10. An assemblage according to claim 8 and comprising a magazine for a supply of rockets disposed below the plane of said support base, and conveyor means for conveying said rockets from the magazine to the head member in the position thereof extending partly through the passage opening.

11. An assemblage according to claim 8 and comprising a magazine for storing therein a supply of launching rail-and-rocket units, means for removing an empty launching rail member from the head member in the position thereof partly protruding through the passage opening, and means for moving the rail member of one of said units into supporting engagement with the head member.

12. An assemblage according to claim 11 and comprising spaced apart mutually engageable fastening means on said head member and said launching rail member, the fastening means on the head member being disposed in a position substantially parallel to said support base when the head member is partly positioned below said support base, and wherein said supply magazine encompasses a rotary drum rotatable about an axis substantially parallel to the support base, said drum including lengthwise circumferentially spaced compartments each for accommodating therein a launching rail-and-rocket unit in a position substantially parallel to the support base, said magazine having a lengthwise loading slot for passage of the fastening means on the head member therethrough and into one of the compartments of the drum for engagement of the fastening means on the head member with the fastening means of the rail member in said compartment.

13. An assemblage according to claim 12 and comprising means in each compartment engageable with an empty rail detachably supported on said head member and protruding into one of said compartments of the drum for disengaging the fastening means of the head member in response to a predetermined angular movement of the drum.

14. An assemblage according to claim 11, wherein the end walls of said drum comprise support means for each of said compartments to support the ends of the rail member of a unit therein.

15. An assemblage according to claim 14, wherein the end walls of said drum include circumferentially spaced notches, one notch in each end wall being provided for each of said compartments to receive the ends of a rail member of a unit therein.

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