

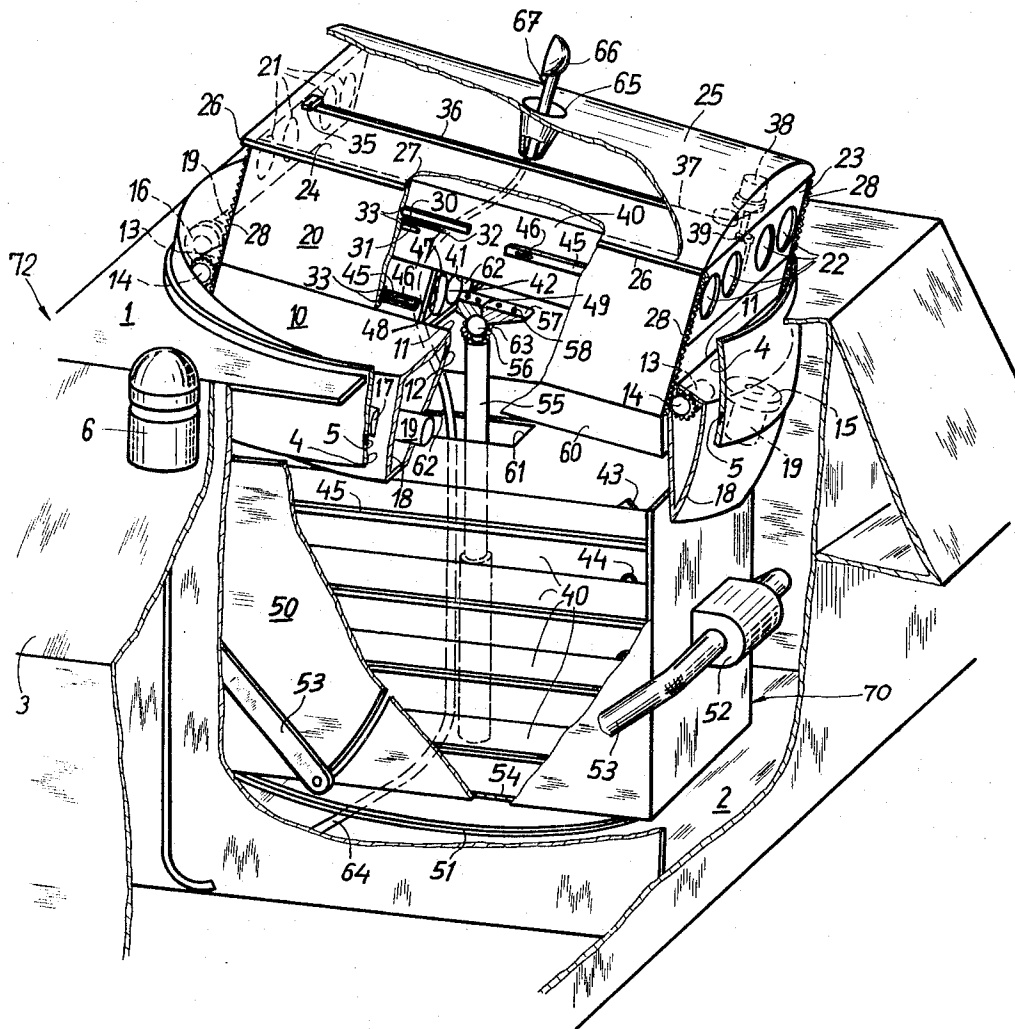
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RETRACTABLE MISSILE LAUNCHER

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RETRACTABLE MISSILE LAUNCHER

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This invention relates in general to a mounting for a missile firing and loading device, and in particular to a new and useful construction for mounting an armored enclosure for firing recoil-driven projectiles above a magazine supply within a carrier from which the projectiles may be moved outwardly into a firing position.

The present invention is an improvement over the prior art, particularly in that it provides a means for mounting an enclosure for firing a plurality of missiles which advantageously includes means for accommodating the missiles in a firing position directly over a supply or magazine for the missiles which is arranged within an armored carrier, such as a vehicle, and wherein the missiles may be maintained in a protected position even when they are in a firing orientation.

While it was previously necessary with devices of this nature to maneuver the vehicle to a protected area in order to change the magazines for positioning the missiles in a firing position, it is possible with the inventive device to do this while under fire.

A further advance in the inventive construction over the prior art is the arrangement of the mounting within an armored carrier such as a vehicle in a minimum of space and without requiring a structure which is easily detectable by the enemy.

In accordance with a preferred arrangement the invention provides a protective housing which is mounted so that it can be moved outwardly from within the silhouette or outline of the vehicle to project from the top thereof. The protective housing which contains the missiles in a position oriented for firing may be withdrawn downwardly into the vehicle or may be extended outwardly, and it is mounted on an armored ring which permits it to be manipulated about horizontal, vertical and longitudinal axes for the purpose of orienting for firing. In the upper part of the front face of the protective housing there are provided several horizontal firing openings which are advantageously arranged in a single plane side by side. The protecting covering advantageously includes an upper cover which may be opened for reloading the carrier, and its rear face includes an injection flap having exhaust gas apertures corresponding to the firing apertures of the missile tubes which are located within the enclosure.

The arrangement of the invention advantageously includes a magazine system having a plurality of missiles arranged in a row side by side which magazine may be shifted upwardly into the retractable enclosure and positioned in alignment with the openings for firing and with the openings for direction of the exhaust gases. The transporting means for the missile which is oriented in a firing position within the enclosure may be ejected from the enclosure through a rear flap provided for this purpose by suitable ejector means which is maintained within the armored enclosure.

The firing and loading device of the invention makes it possible, with surprisingly small space requirements and cost, to utilize the advantages of firing projectiles from retractable changing magazines and to also utilize the additional advantages of an automatic loading device and the advantages of firing a projectile from the protection of an armored cover. The armored cover or

enclosure is such that the missiles may be oriented in a firing position and fired without interfering with the exhaust thrust gases of the missile elements. With the inventive device it is possible to have a plurality of missiles arranged in a row in a firing position and to provide for a reloading of the firing position missiles after the first set has been fired. In addition, the missiles may be directed at any firing angle or orientation with a simple maneuvering of the enclosure which is mounted on a socket member or rotatable ring in the manner of a universal joint.

A further feature of the invention is the magazine arrangement below the armored enclosure in which a plurality of separate magazine elements, each containing a plurality of missiles in firing tubes, are arranged side by side and stacked one above the other. The magazines are loaded, that is moved to a firing position, within the enclosure by automatic means for raising them into the enclosure and locating them in a suitable orientation, i.e. with the missiles within the tubes aligned with the openings at each end of the enclosure. Because the loading process is carried out transversely to the firing plane assumed by the protective housing, the silhouette of the carrier vehicle will not be unduly enlarged and an extremely short loading distance is possible. This loading distance may be maintained to an amount which is only slightly greater than the diameter of the projectiles being used. In a preferred arrangement the magazine elements or holders are preferably made of an inexpensive and expendable fiberglass reinforced synthetic material which serve as packaging and firing tubes for the projectiles. They are ejected backwardly from the protective housing after the firing of a row of missiles as spent units so that no additional space or even cooling measures are required for them.

In the preferred arrangement the protective housing is substantially block-shaped and is mounted within a ring or race for pivotal movement about longitudinal, vertical and transverse axes. The pivotal movement is advantageously effected by friction wheels which are carried on the housing and which engage in the race to both move the housing and to lock it in an oriented position for firing purposes. The device makes it possible to automatically load the missiles and to fire the missiles from the vehicle by only a little opening of the armor covering.

The loading mechanism for the magazine advantageously includes a loading mechanism which automatically lifts each magazine element or holder upwardly as the ones thereabove are expended. In addition, the final transportation of the holder from the storage compartment up into the enclosed housing which projects from the vehicle is done by a lifting element or piston which has a ball end which is lockable with the magazine by spreading pressure to cause automatic locking engagement of the magazine and linking thereto for transporting into the armored enclosure. The magazine is held on a centrally oriented lifting piston by roller elements which permit the correct positioning of the magazine as it is shifted to orient with the armored enclosure. In addition, suitable double walls are arranged for guiding the magazine upwardly into the enclosure to facilitate the accurate placing thereof. Upper and lower guide rails are advantageously arranged within the housing to receive the magazine and they are spring loaded and equipped with a contact control strip for connecting the missiles for firing and guiding purposes. When a magazine which is being changed comes up against the upper guide rails, they form a flush and positive power connection between the correspondingly designed magazine frame and the protective housing. The electrical contact required for starting and guiding the projectile is arranged in a changing magazine in the firing tubes and the contact control

is established when the magazine is correctly oriented. The contact controls may be easily disconnected and the magazine ejected from the rear of the armored enclosure by automatic means after the firing of each missile has been accomplished.

Accordingly, it is an object of this invention to provide an improved armored mount having means for orienting and firing a plurality of missiles and for feeding the missiles from a magazine upwardly into an armored enclosure and into a firing position.

A further object of the invention is to provide a missile storage, firing and handling device for carriers such as vehicles, aircrafts, and the like which includes means defining a magazine for stacking a plurality of holders for missiles vertically, and an armored enclosure rotatably mounted in a ring structure for pivotal movement about a longitudinal, vertical and horizontal axis and disposed above the magazine in a position such that each magazine in succession may be supplied upwardly into the enclosure and oriented within the enclosure in a firing position.

A further object of the invention is to provide a missile launching and firing device which includes an armored enclosure which is universally mounted and also which is retractable into and out of an armored vehicle.

A further object of the invention is to provide a missile handling and firing device which is simple in design, rugged in construction and economical to manufacture.

The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of this specification. For a better understanding of the invention, its operating advantages and specific objects attained by its use, reference should be had to the accompanying drawings and descriptive matter in which there is illustrated and described a preferred embodiment of the invention.

The only figure of the drawing is a somewhat schematic, partially elevational and partially sectional view of a mounting for storing, loading and firing missiles in an armored vehicle constructed in accordance with the invention.

Referring to the drawing in particular, the invention embodied therein comprises a missile storage and firing device generally designated 70 which is mounted in an armored vehicle generally designated 72. In an armored cover 1 of the vehicle the device 70 is located within a loading chamber 2. In accordance with the invention the installation includes an annular element or armor ring 10 which is universally mounted within a ball race or cylindrical element 4. The armor ring 10 carries a protective housing or armored enclosure 20 which can be extended vertically through an opening 11 of the ring 10 or retracted downward in the ring into the interior space 2. The armored enclosure 20 is dimensioned in accordance with the size of the recoil-driven projectiles 42 and the changing magazines or holders 40 which are required therefor.

In the embodiment illustrated, the enclosure 20 is of rectangular or block-shaped formation and its underside facing the loading chamber is open. The front face of the enclosure includes on its upper portion a plurality of firing apertures 21 disposed horizontally in a single plane. When the magazines 40 are positioned within the enclosure 20 in a firing position, the tubular guides for the missiles 41 are aligned with the openings 21. The rear of the tubular guides are aligned with exhaust gas apertures 22 which are defined in a rear wall of the enclosure 20. The rear wall 23 is formed as an ejector flap and it may be pivoted to an open position to permit discharge of the magazine after each of the missiles therein is fired.

The device is advantageously constructed so that reloading or the supply of ammunition may be received downwardly through an arched armored lid 25 having projecting rims 26. Sealing strips 27 at the rims 26 as well as sealing strips 12 on the guides of the openings 11, and sealing strips 5 at the ball race 4, prevent water from penetrating into the loading chamber 2 when the cover

25 is closed, and this is especially so when the armored enclosure 20 is retracted. In order to effect projection and retraction of the armored enclosure 20, there are provided a plurality of positioning motors 13 which drive gears 14 which engage racks 4 and frictionally engages a perpendicular face of each corner of the enclosure 20. The motors 13 are advantageously synchronously controlled to effect the retraction or extension of the armored enclosure 20.

The armored ring 10 is adjustable as to side angle, height angle and inclination with respect to the horizon by means of friction wheels 15, 16 and 17, each of which is carried on the mounting race 4 and frictionally engages a curved or ball-shaped surface 18 of the armored ring 10. The respective friction wheels 15, 16 and 17 are located perpendicularly to a respective pivot axis, that is to a cross axis, to a length axis of the protective housing 20 on a common parallel latitude and to a vertical axis. The friction wheels are all controlled by associated positioning motors 19 in dependence on a sighting device or aiming instrument 6 which projects upwardly from a side wall 3 of the vehicle. The friction wheels act on the race 4 either as a drive for the ring 10 and the enclosure 20 or as a locking element therefor maintaining it in position when it is achieved in side orientation.

The armored enclosure 20 is provided on the interior with guide rails 30 and 31 located at inner side walls and arranged parallel to the firing plane. The upper guide rails 30 form a fixed stop for a changing magazine or holder 40 which is introduced into the protective housing 20 from below. The lower guide rails 31 are spring loaded and connected to a contact control strip 32. During the loading process the control strips 32 are depressed into respective recesses 33 in the side walls of the protective housing by a magazine frame 45. The magazine frame 45 interengages in this manner and is provided with contact points 46. In the snapped in position the guide rails 41 hold one changing magazine 40 in a flush position and in a positive power connection oriented with the missiles aligned with the openings 21 for firing. The electrical connections required for starting and guiding the projectiles lead from spring contact pins 47 in the tubular guides 41 of the magazines 40 via cables 48 to the contact points 46 of the magazine frame 45 which cooperate with the contact control strip 32 of the protective housing via the corresponding cable connections to a device (not shown) for generating the electrical starting and guiding command impulses.

When ammunition is to be supplied from outside the vehicle, both the upper and lower guide rails 30 and 31 including the contact control strip 32 are retracted into the recess 33 in the side walls of the protective housing 20. The upper guide rail 30 and the contact control strip 32 of the lower guide rails 31 are disengaged for the ejecting of an empty changing magazine. At the same time the ejection flap 23 is opened. Ejection means 35 are arranged within the armor lid 25 and they eject the holders 40 after the missiles have been fired. The holders 40 slide along in the guide and out through the opening defined by the flap 23 in a direction away from the firing direction.

As indicated in the drawings, a magazine carrier 50 is located between the space 2 below the enclosure 20 and is rotatable on a thrust bearing race 51 about a perpendicular axis centered in respect to the armored enclosure 20. The magazine carrier 50 is advantageously connected to the enclosure 20 so that it will be moved in respect to the side angle motion of the enclosure 20. A plurality of holders 40 are stacked, one on top of the other, within the carrier 50, and they are lifted automatically upon removal of the top one by the action of rotary piston motors 52 acting through arms 53.

The uppermost holder 40 in a stack is then transferred within the enclosure 20 by means of a piston 55 which is mounted on a base plate 54 and includes an extendable

portion which may be extended or retracted under a suitable control of fluid which is directed into the base portion. The upper end of the piston 55 carries a ball 56 which may be lockably engaged with the underside of a holder by contact spreading pressure. For this purpose the ball carries locking detent 57 which becomes oriented on the sliding blocks 58 with guide surfaces 49, provided on the underside of the changing magazines 40. During the upstroke of the lifting piston 55 the changing magazines 40 are introduced into the protective housing 20 and they are guided upwardly by the bevelled walls 60 of the lower portion of the housing. Each holder 40 includes side abutments 43 which are arranged at the upper edge and which interengage with similarly shaped recesses 44 at the underside of the next adjacent magazine. The locking abutment and recesses insure that there will be no lateral shifting of the holders 40 with respect to each other and thus their handling is facilitated.

In order to allow the lifting piston 55 to pass through the holders 40 which are not being transported into the enclosure 20, each of them is provided in the area of the center of gravity with a cutout portion 61. The cutout 61 lies between the central firing guides 41 and extends into a slot 62 ending at the front face of the changing magazine in the firing direction. The dimensions of the cutout openings 61 at the upper side of the holders 40 are made slightly larger than the top of the lifting piston having the detents engaged. They become smaller toward the underside of the holders 40 in a manner such that when the lifting piston is lowered, the detents are automatically snapped up on the lower area of the cutout of each changing magazine. Under the effect of springs 63 which are linked to the ball 56 the detents are returned to their spread position in the upper part of the cutout of the lower holder 40 after having passed through the cutout in the upper magazine and are thus in engagement with respect to the adjacent holder when the lifting piston is in its subsequent upstroke.

The space of the cutout 61 which remains free in a firing position of the holder 40 and a corresponding opening 65 in the armor lid 25 is utilized for the assembly of an extendable and retractible glass fiber optic 67. The optic 67 can be rigidly coupled to the protective housing 20 in the firing direction and it is combined with a pilot beam transmitter. From it a readily bendable and twistable connecting cable 64 leads through the slot 62 of the holders 40 to the base plate 54. The cable 64 penetrates the base plate in the rotational axis of the magazine carrier in front of the eccentrically mounted lifting piston 55 and extends from there to the sighting device 6 or to a command post (not shown).

Also arranged in the armored lid 25 are the ejection means. A sliding piece mounted in the guide 36 in a firing direction and corresponding with the respective upper front edge of the holder 40 in the firing position serves as ejector. The sliding piece is actuated by a cable line 37 controlled by a positioning rotor 38 driving a spindle 39. The same mechanism provides means for opening the ejector flap.

While a specific embodiment of the invention has been shown and described in detail to illustrate the application of the inventive principles, it will be understood that the invention may be embodied otherwise without departing from such principles.

What is claimed is:

1. A mounting for storing, handling and firing jet-propelled missiles for use in an armored carrier, said mounting comprising an enclosure having a front and a rear wall each with at least one opening for firing a missile and for permitting escape of the thrust gases of the missile respectively, supporting means for said enclosure permitting universal pivotal movement and extension and retraction of said enclosure in respect to said carrier, means carried on said supporting means engageable with said enclosure for moving said enclosure to an extended

position for firing and to a retracted position for loading, an opening in the bottom of said enclosure for receiving a magazine containing a plurality of said jet-propelled missiles arranged side by side therein, means for transferring said magazine to the enclosure when the latter is in its retracted position, said magazine being arranged in a magazine carrier located below said enclosure and rotatable about a perpendicular axis in respect to said enclosure.

2. A mounting according to claim 1, wherein said supporting means includes a spherical ring adapted to be affixed in position on an armored plate, a spherical socket member supporting said enclosure, and driving means on said socket member engageable with said ring for pivoting said socket member with said enclosure about horizontal vertical and transverse axes.

3. A mounting according to claim 2, wherein said driving means includes a friction wheel member carried on said socket member and rotatably engaging said ring member, and motor means driving said friction wheel member for positioning said socket member and said enclosure.

4. A mounting according to claim 3, including at least three separate wheel members for pivoting said socket member about horizontal, vertical and transverse axes.

5. A mounting according to claim 1, wherein said supporting means includes a rotatable gear, a motor driving said gear, and rack means defined on said enclosure engageable with said gear, said gear being rotatable in engagement with said rack means to extend and retract said enclosure.

6. A mounting according to claim 1, wherein said enclosure is a substantially block-shaped member having at least an armored roof.

7. A mounting according to claim 1, wherein said enclosure includes a rear wall which is pivotal, and means for ejecting a missile carrier out of the rear of said enclosure when said rear wall is pivoted outwardly.

8. A mounting according to claim 1, wherein said enclosure includes a plurality of openings arranged in a row for the firing of missiles and for the escape of thrust gases from the missiles located in the respective front and rear walls of said enclosure, and a missile holder adapted to be stored in said magazine and transferred upwardly to said enclosure, said holder accommodating a plurality of missiles arranged in a row and spaced in the same manner as said openings in said enclosure, and means in said enclosure for anchoring said holder in a position aligning the missiles therein with the openings in said enclosure.

9. A mounting according to claim 8, wherein there are a plurality of holders for missiles stacked vertically below said enclosure, means for urging the stack upwardly to a location at which the uppermost one is directly below said enclosure, and a lifting member disposed centrally within said magazine engageable with each holder from below to move said holder with the missile therein upwardly into said enclosure, and means in said enclosure engageable with the holder to position it with the missiles in alignment with the openings defined in said enclosure.

10. A mounting according to claim 9, including means in said enclosure for ejecting the holder from the enclosure after the missiles therein have been fired.

11. A mounting according to claim 10, wherein said ejecting means includes means for opening the rear wall of said enclosure.

12. A mounting according to claim 1, including a substantially block-shaped magazine located below said enclosure, said enclosure having flared lower walls at the lower end thereof, a plurality of missile holders stored in said magazine and being of a dimension less in width and length than the flared lower walls of said enclosure and being centered by the flared walls of said enclosure during the upward movement thereof into said enclosure.

13. A mounting according to claim 12, including a lifting piston disposed centrally within said magazine, each of said holders having an opening centrally defined therein to permit passage of said lifting piston there-through, and means on the end of said lifting piston engageable with the bottom of the uppermost one of said holders for transporting said holders upwardly from said magazine into said enclosure.

14. A mounting according to claim 13, wherein said means on said lifting piston engageable with said holder includes spring biased detents which are resiliently engageable with said holder.

15. A mounting according to claim 1, including a sighting guide disposed to project from the upper wall of said enclosure, and electrical control means connected between said sighting guide and the interior of said enclosure for firing and controlling said missiles.

16. A mounting according to claim 1, wherein said support means includes a mounting spherical ring member, and friction wheels engaged with said ring member to drive and lock said enclosure in a selected orientation in respect to side angle, height angle and firing plane of the projectiles contained therein.

17. A mounting according to claim 1, including a plurality of missile holders arranged in said magazine, a piston motor, an arm connected to said piston motor and driven thereby engaged with the lowermost one of said holders and adapted to move said holders upwardly

within said magazine to position the upper one of said holders in a ready position for transfer in said enclosure, said enclosure being movable to a retracted position directly above the uppermost one of said holders, and piston means for transferring the uppermost one of said holders into said magazine.

18. A device according to claim 17, wherein said piston means includes a piston member at its outer end and a ball having means thereon for locking said ball by spreading pressure with locking detents carried by said holders.

19. A mounting device according to claim 1, wherein said enclosure has guide rails therein for holding and connecting said missile holders electrically and mechanically, and control means connected to said guide rails for electrically controlling the orientation of said housing for effecting firing of said missiles.

20. A mounting according to claim 19, including a glass fiber optic extending from said enclosure, a customary sighting device mounted adjacent said glass fiber optic on a stationary member, a flexible connecting cable extending between said optic and said sighting device extending through the axis of said enclosure, said optic and said sighting device being connected electrically for the blending of an image for firing purposes.

No references cited.

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