Aug. 23, 1960 W. J. ROSS ET AL 2,949,823

COMBINATION DOLLY-LAUNCHER FOR MISSILES

Filed April 30, 1959 3 Sheets-Sheet 1

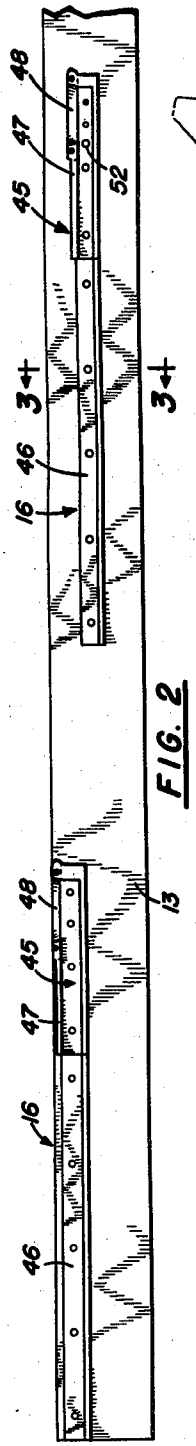


FIG. 2

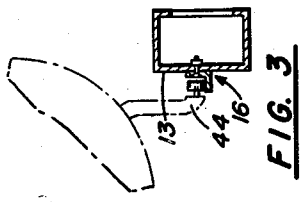


FIG. 3

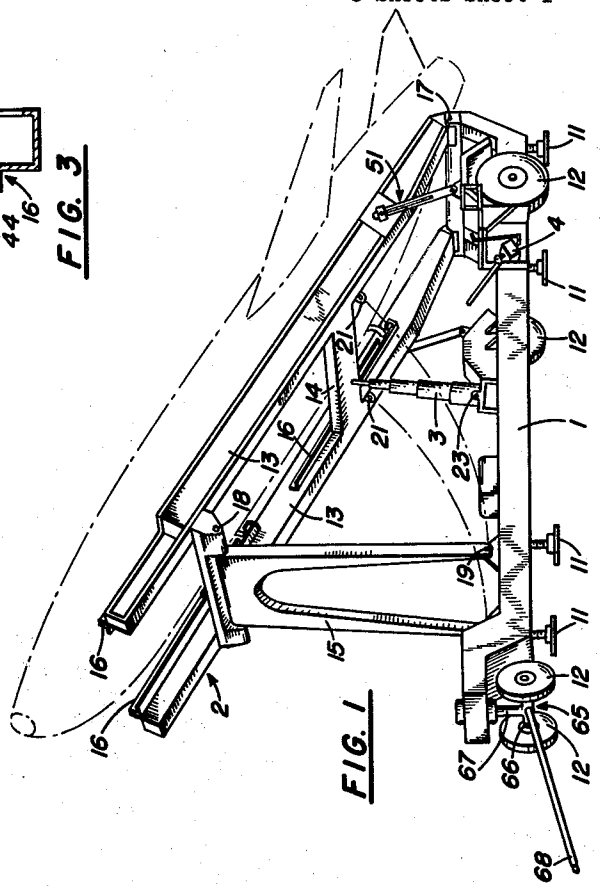


FIG. 1

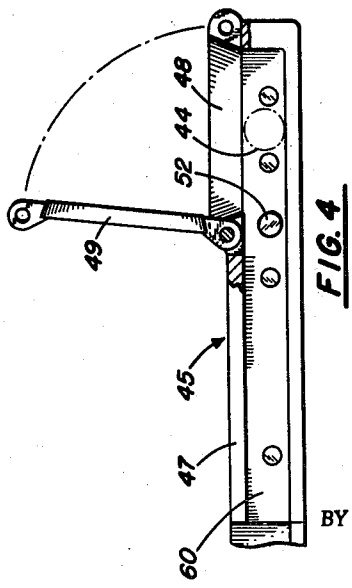


FIG. 4

INVENTORS
WILLIAM J. ROSS
WILLIAM A. WALKER

BY R. I. Tompkins

ATTORNEY

COMBINATION DOLLY-LAUNCHER FOR MISSILES

Filed April 30, 1959 3 Sheets-Sheet 2

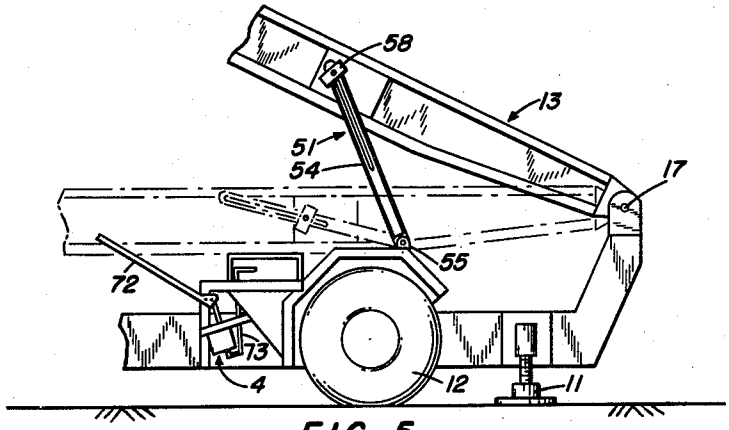


FIG. 5

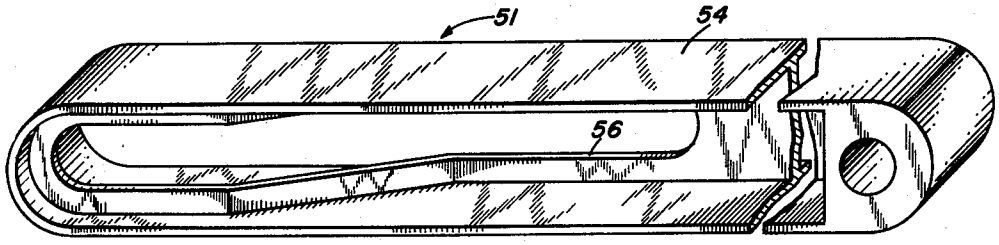


FIG. 6

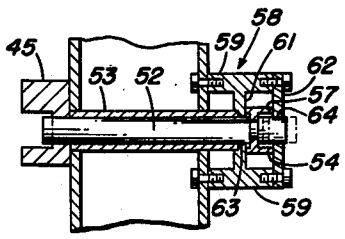


FIG. 7

INVENTORS
WILLIAM J. ROSS
WILLIAM A. WALKER

BY R. S. Tompkins
ATTORNEY

Aug. 23, 1960 W. J. ROSS ET AL 2,949,823

COMBINATION DOLLY-LAUNCHER FOR MISSILES

Filed April 30, 1959 3 Sheets-Sheet 3

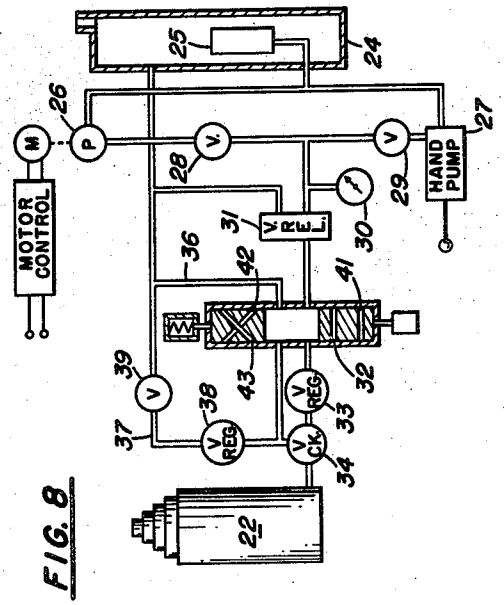


FIG. 8

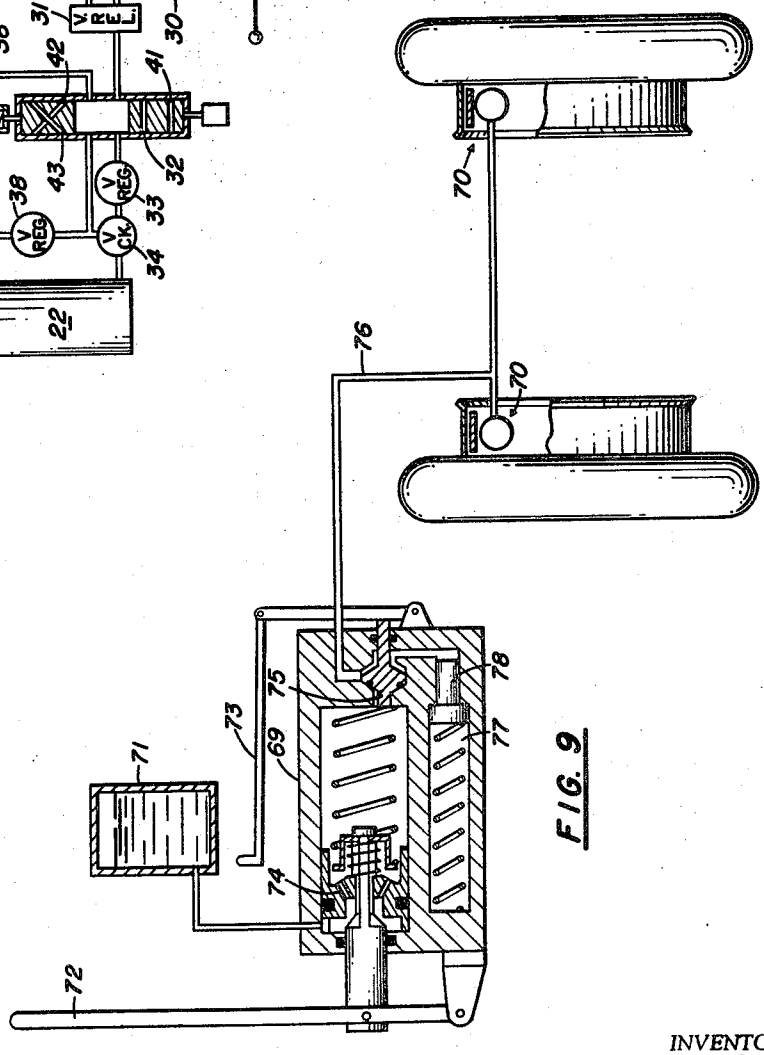


FIG. 9

INVENTORS
WILLIAM J. ROSS
WILLIAM A. WALKER

BY R. S. Tompkins

ATTORNEY

United States Patent Office 2,949,823 Patented Aug. 23, 1960

2,949,823

COMBINATION DOLLY-LAUNCHER FOR MISSILES

William J. Ross, Long Beach, and William A. Walker, Palos Verdes Estates, Calif., assignors to the United States of America as represented by the Secretary of the Navy

Filed Apr. 30, 1959, Ser. No. 810,186

2 Claims. (Cl. 89—1.7)

(Granted under Title 35, U.S. Code (1952), sec. 266)

The invention described herein may be manufactured and used by or for the Government of the United States of Amerca for governmental purposes without the payment of any royalties thereon or therefore.

The present invention relates to a combination dolly-launcher for missiles, and more particularly to a launcher which is used to stow the missle, transport the missile from stowage position to firing position and fire the missle.

Present systems of missile handling and firing, particular reference being had to shipboard use, requires the use of several pieces of equipment. Most commonly a dolly is used to transport the missle from stowage position to firing position. Once at firing position it is necessary to provide hydraulic mechanism or other means for mating the dolly with the launcher and for transferring the missile to the launcher. Similar equipment is required at the stowage position to transfer the missile from the storage racks to the dolly.

One of the more serious disadvantages of the present system is the shock hazards involved both in storing the missiles on board ship and in transferring the missiles from racks to dollies to launchers, the shock hazards being aggravated by the present practice of storing the warheads directly in the missiles. The process of mating the dolly with the launcher and transferring the missile thereto is always a difficult procedure and is particularly so when the ship is pitching or rolling to any degree. Tactically speaking, the present system is slow because of the many steps of handling involved. A further distinct disadvantage is that if the ship has only one launcher, as is often the situation because of space limitations, and the launcher is rendered inoperative because of mechanical failure or enemy action, the firing capacity of the ship will have been destroyed.

The instant invention combines the several functions of mobility, stowage and firing into a versatile, unitary structure in which the missile is loaded on the dolly-launcher ashore and the missile loaded dolly-launcher then stowed on ship. The dolly-launcher is constructed so that it may be moved from the stowage position to the firing position and the missile fired directly therefrom without the necessity of transferring the missile to other equipment. The advantages of such a system are self-evident. Since the missile is not removed from the launcher while aboard ship until fired, the attendant risks and shock hazards of handling are eliminated. Additionally, the dolly-launcher is provided with rubber tires to mitigate shipboard shocks. The speed and ease with which the missiles can be fired is greatly increased, and because each missile has its own launcher it can be fired independently without regard to what has happened to the other launchers.

Accordingly, it is an object of this invention to provide a combination dolly-launcher.

Another object is to provide a versatile dolly-launcher which may be used to stow, transport and fire a missile.

A further object is to provide a dolly-launcher for use aboard a ship on which a missile may be loaded while ashore and not removed until fired, and which protects the missile from shock hazards.

A final object is to provide a dolly-launcher which constitutes an independent firing unit.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

Fig. 1 shows an isometric view of a preferred embodiment of the present invention.

Fig. 2 is a side view of the guide rails of the dolly launcher.

Fig. 3 is a section view taken along the section line 3—3 of Fig. 2.

Fig. 4 is an enlarged view of a portion of the guide rail.

Fig. 5 is a sectional view of a portion of the invention.

Fig. 6 is an enlarged view of the cam shown in Fig. 5.

Fig. 7 shows another portion of the guide rail.

Fig. 8 illustrates a schematic view of the hydraulic elevating mechanism.

Fig. 9 is a schematic view of the hydraulic braking system.

As shown in Fig. 1, the major parts of the dolly-launcher comprise a bedplate 1, girder assembly 2, hydraulic elevating means 3 and braking system 4.

Four bedplate jacks 11 are permanently mounted at each corner of the bedplate. The jacks are fully raised for maximum ground clearance when the apparatus serves as a dolly, and are fully extended to remove the weight of the launcher from the wheels 12 when the launcher is in firing position. The wheels 12 are provided with standard airplane pneumatic tires which serve to protect the missile against shipboard shocks and which also afford considerable shock protection when the loaded dolly-launcher is lowered from a crane to a ship or other structure. When the dolly-launcher is in stowage position, the jacks 11 are extended until they contact the deck or ground thereby steadying the apparatus and at the same time letting the weight of the dolly-launcher rest on the shock mitigating wheels.

The girder assembly 2 comprises a pair of girders 13 separated by beam 14, a girder support 15 and guide rails 16 secured to the inner sides of the girders 13, the entire assembly being pivotally connected to the aft end of the bedplate at 17. The girder support 15 is pivotally connected at one end to the underside of the girders at 18, the other end being pinned to the bedplate at 19 when the girders are elevated to firing position as shown in Fig. 1. When the girders are lowered to the bedplate and the missle is in stowage position, the girder support is pinned to the ears 21 on the underside of the girders 13.

The hydraulic elevating means 3 is shown in detail in Fig. 8 and is comprised by a four-step hydraulic ram 22 connected to the beam 14 and pivotally connected to the bedplate at 23. Hydraulic fluid is pumped to the ram from a reservoir 24 through an oil filter 25, relief valve 31, four-way valve 32, flow regulator 33 and check valve 34. Hydraulic pressure is normally built up and maintained in the system by the electric motor-driven hydraulic pump 26, although a hand pump 27 is provided in case of motor or hydraulic pump failure. Shutoff valves 28 and 29 permit either pump to be isolated from the system while the other pump is in operation. A pressure gage 30 permits hydraulic pressure to be monitored at all times, any excessive pressure acting to open valve 31 to permit the excess fluid to return to the reservoir. In order that the ram can be lowered, a return line 36 and pilot line 37 are provided to the reservoir.

the pilot line including a flow regulator 38 and a shutoff valve 39.

When the ram is extended to raise the missile to firing position (Fig. 1), hydraulic pressure is applied through relief valve 31, port 41 of valve 32 and check valve 34, the check valve serving to maintain pressure in the ram cylinder. The girder assembly is lowered by shifting valve 32 causing fluid pressure to be applied through port 42 to pilot line 37 at which time check valve 34 is unseated. The fluid in the ram cylinder returns to the reservoir through the check valve, port 43 and return line 36. The pilot line shutoff valve 39 is open during operation of the motor-driven pump, but is closed during operation of the hand pump.

Referring to Figs. 1, 2, and 3, the missile is provided with fore and aft slippers 44 which ride on the rails 16 secured to the inner side of the girders in the fore and aft positions. The forward portion of each rail 16 is composed of an angle iron 46 while the aft portion or slipper guide 45 has a lip 47 which serves to prevent vertical movement of the slippers and to lock the missile to the dolly launcher. Each slipped guide has an opening 48 which facilitates loading of the missile on the launcher, and, as shown in Fig. 4, a key 49 fits over the opening when the missile has been loaded on the launcher.

In order to prevent the missile from moving forward on the rails, a cam assembly 51 is provided to lock the aft missile slippers in the aft slipper guide. As shown in Figs. 1, 5, 6, and 7, each cam assembly comprises a cylindrical bar or stop 52 projecting the width of each girder through a bushing 53 into the wheel track 60 of the aft slipper guides forward of the slippers, and an elongated cam 54 pivotally secured at one end to the bed of the launcher at 55. The cam 54 has a cam track 56 extending approximately one-half the length of the cam, and the stop has a reduced neck portion 57 at one end thereof which rides in the cam track. A generally H-shaped bracket 58 having legs 59 and a crossbar 61 is secured to each girder on its outer side, and a cover plate 62 is bolted over the outer end of the bracket. The crossbar 61 fits over the end of bushing 53 and has an aperture 63 concentric with the bushing interior while the cover plate has a similar aperture 64 so that the stop may extend completely through the bracket and plate. The cam passes between the crossbar 61 and the cover plate 62 so that as the girder assembly is raised to firing position the cam will move relatively to the stop and bracket with the stop moving in the cam track whereby the stop will be withdrawn from slipper guide.

The bedplate is provided with a tricycle-type carriage 65 comprising an axle 66 on which the front wheels 12, equipped with aircraft tires, are mounted, a vertical shaft 67 suspended from the bedplate structure, and a tow bar 68 adapted to be secured to a tow truck or any other convenient towing means. The two rear wheels are mounted on separate axles which are bolted to the bedplate and are equipped with disc-type hydraulically actuated brakes 70. The braking system as shown in Fig. 9 includes a brake cylinder 69, fluid reservoir 71, brake lever 72, and parking lever 73. When the launcher is in motion, the degree of braking required can be determined by moving the braking lever 72 to the right thereby allowing fluid from the reservoir to pass through the spring-biased valve 74, check valve 75 and into the brake line 76. When the launcher has stopped, movement of the parking lever to the left serves to seat the check valve 75 thereby locking the hydraulic fluid in the brakes and brake lines and allowing the brake lever to be released without releasing the braking pressure. The parking brake may be released by simply applying additional braking pressure with the brake lever thereby unseating the check valve. A compensating chamber 77 and piston 78 are provided in the brake cylinder which permits the hydraulic fluid to expand, due to temperature rises, when the launcher is parked with the brakes energized.

The dolly-launcher and the missile may be mated at the factory site or any place remote from the firing area, and if used aboard ship, the loaded dolly-launchers may be stacked in tiers thus conserving space. When in use, the dolly-launcher is towed to the firing area and the jacks 11 extended until they support the weight of the launcher. The ram is then actuated and the girder assembly raised to firing position. As the girder assembly is raised the action of cams 54 will withdraw the stop 52 from the aft slipper guides so that the missile and launcher can be parted. After firing the girder assembly is lowered, the jacks withdrawn and the dolly-launcher removed to a storing area. It will be obvious that the readying and firing of each missile can be accomplished quickly and independently of the other missiles, and that the dolly-launchers can be stowed and fired in areas of limited space.

The dolly-launchers can be towed by towing vehicles up to speeds of 15 miles an hour. If used aboard ship the dolly-launchers can also be towed by means of the conventional drive chain and shuttles located in a track in the deck area.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. A combination dolly and missile launcher comprising a bedplate, front and rear wheels on said bedplate, aircraft tires on said wheels for mitigating shock, adjustable jacks secured to the underside of said bedplate, a girder assembly pivoted at one end to said bedplate, said girder assembly including front and aft guide rail means running longitudinally thereof for guiding the missile during blast-off, said aft guide rail means including slipper guides, each of said slipper guides having a wheel track, a stop pin slidably mounted in a side of said girder assembly and having one end projecting into a wheel track, a cam pivoted at one end to said bedplate, said cam having a cam track, and means slidably mounting the other end of said stop pin in the cam track whereby movement of the cam relative to the pin will cause said one end of said pin to withdraw from the wheel track, hydraulic elevating means pivotally mounted on said bedplate and secured to an intermediate portion of said girder assembly for raising and lowering said girder assembly, a girder support pivotally secured to the other end of said girder assembly, and means for securing said girder support to said bedplate when the girder assembly is in a raised position.

2. The apparatus as claimed in claim 1 wherein said hydraulic elevating means comprises a four-step hydraulic ram, a reservoir and fluid connection means between said reservoir and ram, said fluid connection means including a motor-driven pump, a hand pump, and valve means operable to isolate either pump from said ram.

References Cited in the file of this patent

UNITED STATES PATENTS

2,307,644	Schlumbrecht	Jan. 5, 1943
2,429,021	Gould et al.	Oct. 14, 1947
2,568,455	Lindvall	Sept. 18, 1951
2,729,406	Bush	Jan. 3, 1956
2,826,960	Schiavi	Mar. 18, 1958