April 21, 1959 R. S. BERGNER ET AL 2,882,795

ERECTING AND LAUNCHING APPARATUS

Filed March 15, 1956 3 Sheets-Sheet 1

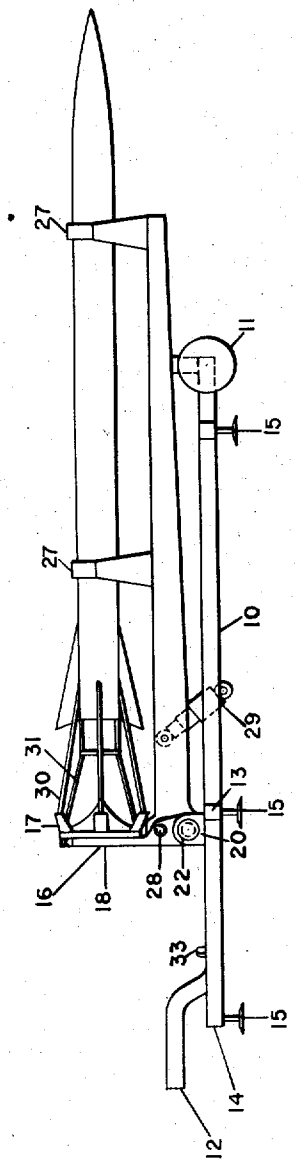


FIG. 1

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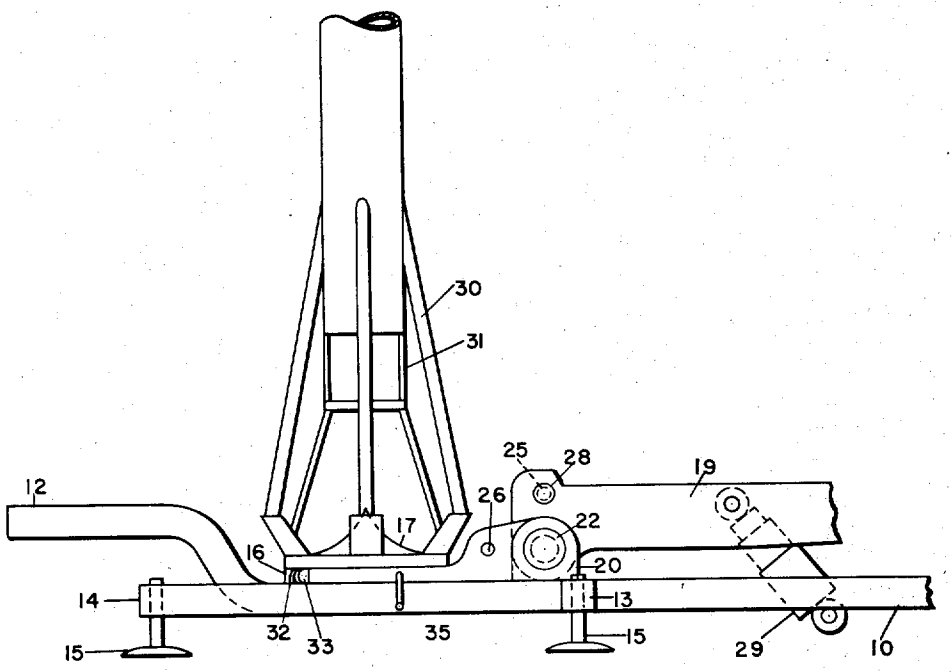


FIG. 2

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ERECTING AND LAUNCHING APPARATUS

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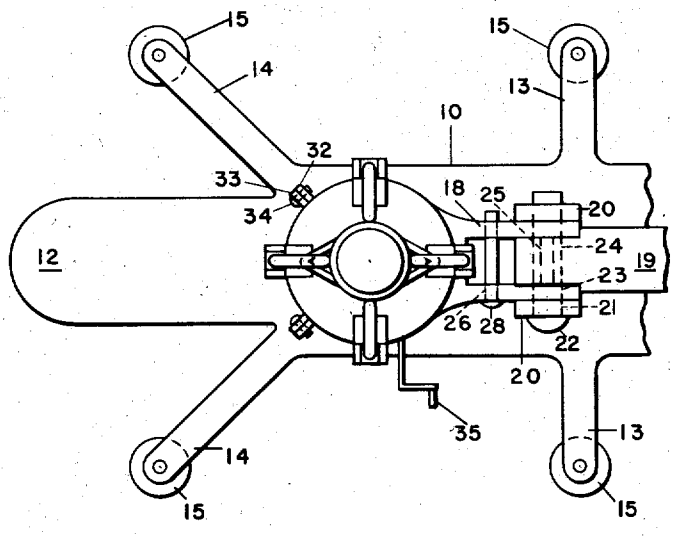


FIG. 3

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2,882,795

ERECTING AND LAUNCHING APPARATUS

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2 Claims. (Cl. 89—1.7)

This invention relates to erecting and launching apparatus for guided missiles.

Under present practice, so far as applicant knows, guided missiles are erected into launching position more or less permanently. That is to say, the missile is erected to a vertical position on its launching base, oriented for launching, and permitted to remain in that position ready for launching. No provision is made to store the missile away from its launching position and then to transport it quickly to such position for erection. Furthermore, once the missile is erected into such permanent position, no provision is made for lowering it for transfer to another launching position or for lowering it to horizontal position adjacent its launching position so that it can be camouflaged.

The main object of this invention is to provide a transportable structure adapted to support a guided missile during transportation, said structure including a combination of elements capable of rapidly erecting the missile to launching position when desired and of functioning as a launching apparatus when such erection is completed.

A further object is to provide a mobile unit capable of transporting a guided missile from place to place, the chassis of such unit being adapted to form part of apparatus to erect the missile into launching position.

Another object is to provide apparatus upon which a missile may be stored and transported from place to place, said apparatus being adapted to erect such missile for launching in a minimum of time and to lower the missile again in the event it is desired either to change its launching position or to facilitate camouflaging.

Another object is to provide a vehicle a part of which is adapted to serve as launching apparatus for a guided missile, said vehicle being capable of transporting the missile and launching apparatus from place to place, said apparatus including a boom hinged on the vehicle chassis capable of erecting the missile to vertical position for orientation and of returning the missile to horizontal position for storage and/or transport within a minimum of time.

In the drawings, the structure of the invention is diagrammatically illustrated in Fig. 1 having a missile stored thereon ready for transport.

Fig. 2, also diagrammatic, the invented structure is shown with the missile, illustrated in fragment, moved into erect position ready for launching, the boom being illustrated in fragment and returned to down position.

In Fig. 3, also diagrammatic, the invented structure is illustrated in plan on a larger scale than the scale of Fig. 1, the boom being illustrated in fragment in down position and the missile being illustrated in cross section in erect position.

Referring now to Fig. 1 of the drawing, semi-trailer or chassis **10** has a supporting wheel and axle assembly **11** at its rear and a fifth wheel **12** at its front for connection with a tractor (not shown). Extending laterally from the chassis are two pairs of outriggers **13** and **14**,

the outriggers **13** being disposed perpendicular to the longitudinal center line of the chassis and the outriggers **14** being disposed angularly to said center line and in a forward direction. These outriggers may be pivoted back parallel to the vehicle body and secured thereto for transporting. Connected to the ends of the outriggers and disposed therebeneath are leveling jacks **15**. Adjacent the wheel and axle assembly and forward thereof is another leveling jack **15**. These jacks **15** are provided with large anchor pads to support the chassis whenever the tractor is withdrawn and the wheels of the chassis are removed. It is contemplated that the missile and the apparatus of the invention will be transportable from place to place and that the chassis will become the bed element of the invented apparatus when the vehicle has been moved to desired location. It is contemplated that the wheels of the vehicle may be removed so that the chassis will then rest upon the jacks.

Hinged to the chassis **10** is the launching base **16** of the missile. In the illustrative embodiment, this base **16** has a circular body **17** and a rearwardly extending clevis **18** (see Fig. 3) adapted to engage the lower end of the erecting boom **19**. A pair of spaced lugs **20** secured to the chassis (or made integral therewith) are provided with holes **21** arranged opposite each other for the reception of a hinge pin **22**. Hinge pin **22** extends through said holes **21**, through holes **23** in and adjacent the free ends of the clevis **18**, and through an aligned hole **24** in the lower end portion of the boom **19** to hold the launching base, the erecting boom, and the chassis in assembled position. The launching base **16** and the boom **19** are thus hinged to the chassis and may be pivoted in relation to the chassis independently of one another. Formed in the lower end of boom **19** above and parallel to transverse hole **24** is a transverse aperture **25**. Launching base **16** has a transverse aperture **26** between its hinge holes **23** and its body **17**, said aperture being parallel to aperture **25** when the boom is in down position as shown in Fig. 2. When the boom is in such down position on the chassis and the missile is disposed in cradles **27**, a shear pin **28** is inserted through the clevis and boom apertures **26** and **25** respectively. The boom and launching base may then be pivoted together so that the boom will assume its erect position (see Fig. 2) to locate the missile in its erect position. The shear pin may then be withdrawn and the boom lowered to horizontal position, leaving the base down and the missile erect. The elevation of the boom and missile and the lowering thereof may be effected by a hydraulic mechanism **29**, which forms no part of the invention.

Missile stabilizing arms **30** and support frame **31** are secured to the body **17** of the launching base **16** and extend upwardly to support the missile. Tie down lugs **32** are provided on the base and mate with lugs **33** on the chassis so that locking pins **34** may be inserted therethrough to secure the base to the chassis.

A missile azimuth adjusting device **35** is provided for rotating the circular body **17** of the base in order to obtain the proper azimuth orientation of the missile prior to launching.

Normally, when the missile is stored in the invented apparatus away from the firing site, as shown in Fig. 1, the boom is maintained in down or horizontal position on the chassis and the base member is connected thereto by pin **28**. The missile is arranged on the boom cradles **27** abutting the base support frame **31**. Stabilizing arms **30** engage the lower end of the missile. When it is desired to locate the missile at a launching site ready for firing, the chassis is coupled to a tractor and transported to the site. There the tractor is uncoupled and the wheels **11** of the chassis are removed. The chassis is

then resting directly on jacks **15** and levelling can be effected. Hydraulic mechanism **29** thereupon rotates the boom and cradled missile to erect position and of course also rotates the connected base member to operating postiion on the chassis. The base is secured to the chassis and the boom lowered, as previously described. If thereafter it should be desired to lower the missile to down position in order to relocate it at another firing site or to return it to storage or to camouflage it, the boom is rotated to erect position to bring the cradles into engagement with the missile. Pin **28** is inserted to connect the boom and base, the locking pin **34** is removed to release the base from securement to the chassis, and the hydraulic mechanism lowers the boom, base, and missile.

Although there has been shown manual means to unlock the base **16** from the boom **19** and to lock the base in down position by means of pins **34** through lugs **32** and **33**, mechanical remote control means can be used to effect such operation.

While there has been hereinbefore described an approved embodiment of this invention, it will be understood that many and various changes and modifications in form, arrangement of parts and details of construction thereof may be made without departing from the spirit of the invention, and that all such changes and modifications as fall within the scope of the appended claims are contemplated as a part of this invention.

What we claim is:

1. An erector launcher for guided missiles comprising a chassis; means to establish the chassis in level position on the ground; a boom pivoted on the chassis, said boom being pivotable between horizontal and vertical position on the chassis; means on the boom to support a missile when the boom is horizontally disposed; a base member to support a missile when the latter is disposed in erect position on the chassis, said member being pivoted to the chassis; a releasable connection between the boom and base member, said boom and base member being pivotable together when connected; and power means on the chassis operatively connected to the boom to pivot into erect position the boom and connected base and a missile supported on the boom.

2. An erector launcher for guided missiles comprising a chassis; a boom pivoted to the chassis and rotatable between horizontal position to vertical position; means on the chassis forward of the pivot to support the boom when the latter is disposed in horizontal position; means on the boom to support a missile when the latter is disposed in horizontal position; a member to verse as a base for a missile, said member being pivoted to the chassis for rotation between horizontal and vertical position, said member and the boom being pivoted about the same axis; a releasable connection between the boom and base member, said boom and base member being pivotable together when connected; and power means on the chassis operatively connected to the boom to rotate the boom and connected base to erect position to dispose a missile in firing position supported by the base, said boom being adapted to be returned by the power means to horizontal position for support by the support means on the chassis upon release of its connection to the base member.

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