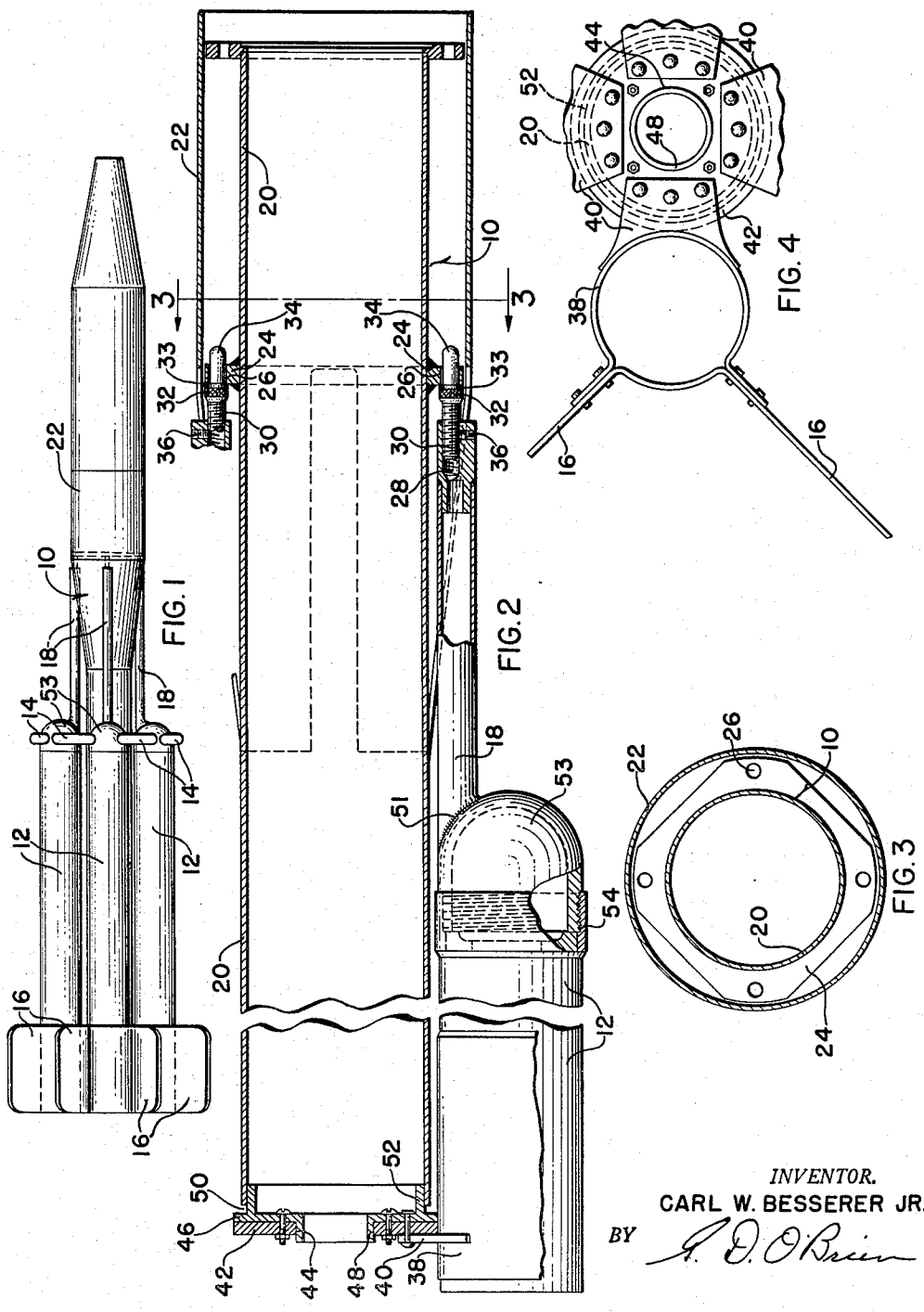
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LAUNCHING CARRIAGE FOR JET-PROPELLED MISSILES

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LAUNCHING CARRIAGE FOR JET-PROPELLED MISSILES

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The present invention relates to an improved launching carriage for jet-propelled missiles. More particularly, it relates to a launching carriage which will launch a missile without damage, and without deflecting it from its intended flight path.

It will be understood that a jet-propelled missile, having a source of motive power such as an athodyd, more commonly known as a ram-jet, depends for its operation on the automatic compression of air at the combustion zone, such compression being maintained by the swift travel of the ram-jet through the air, during normal flight. Obviously such ram-jets cannot start from rest under their own power, but must be accelerated, by suitable means, to speeds such that the necessary air compression is provided initially. Usually rockets are employed for this purpose, a suitable number thereof being grouped symmetrically, and associated releasably with the ram-jets for starting or "launching" the latter.

Launching devices previously used customarily consisted of structures surrounding the rear ends of the missiles and supporting such rockets for supplying the launching impulse. A plate closing the rear end of this structure within the circle of the rocket nozzles formed a seat for the rear end of the missile and transmitted the launching thrust thereto. Upon exhaustion of the rocket fuel, separation of the missile and the carriage was intended to take place because the deceleration of the carriage due to aerodynamic drag was greater than that of the missile.

In practice, this type of launching carriage proved to be very unreliable. In some cases, thrust crumpled the thin-walled tail pipe of the missile, and thus caused aberrations in the flight of the missile after separation. In other cases, the tail pipe did not seat squarely on the closing plate of the carriage; this caused the thrust to be transmitted unevenly with respect to the axis of the missile, resulting in a deflection of the missile from its intended course. In still other cases difficulty was encountered in alining the axis of the missile with that of the carriage, with resultant jamming of the missile in the carriage, preventing or delaying separation.

As a result of the above-mentioned difficulties, much time was lost in unsuccessful test flights and many valuable missiles were destroyed.

Consequently, one object of the present invention is to provide a launching carriage for a ram-jet or other self-propelled missile which will launch the missile without damage.

Another object of the invention is to provide a carriage which will launch a missile without deflecting it from its intended line of flight.

Still another object is to provide a carriage which will separate easily and automatically from the missile.

In the drawings, which are largely diagrammatic:

Figure 1 is a side view of a ram-jet missile and its associated launching carriage;

Figure 2 is a detail side view, on a larger scale, partly in axial section, and with intermediate portions omitted,

of one of the motor rockets and a portion of the ram-jet missile;

Figure 3 is a transverse section of the missile as indicated at 3—3 in Fig. 2; and

Figure 4 is a fragmentary detail rear view of the centering means.

Referring first more particularly to Fig. 1, a ram-jet missile 10 is accelerated to flying speed by an arbitrary plurality of rocket motors 12. These rocket motors, four of which are used here, for example, are assembled to form a carriage by being interconnected by means of forwardly located pressure-equalizing manifolds 14 providing communication between their heads 53, which may be secured to the bodies by screw threads 54, and by attachment to a rear structure which includes fins 16. The propelling thrust is transmitted to the missile by thrust members, such as rods or tubes 18 which form forward extensions of the respective rocket-motor heads 53 (Fig. 2) and may be rigidly secured thereto in any suitable way, as by a welded connection at 51. These thrust members 18 bear against a suitable thrust-receiving fitting 24, shown in detail in Figs. 2 and 3, as a preferably annular member, rigidly secured to or integral with the missile 10 at, or near, its center of mass. A device for positioning or centering the rear end of the missile is located at the rear end of the carriage and is shown in detail in Figs. 2 and 4.

Referring now to Figs. 2 and 3, the rear end of the missile 10 is formed as a tubular combustion chamber 20 which merges, at its forward end, with the body 22 of the missile. A thrust ring 24 is welded or otherwise rigidly secured to the exterior of the combustion chamber 20 at the rear end of the body 22. Holes 26 in the thrust ring 24 are alined with the forward ends of the thrust transmitting elements 18. A threaded longitudinal bore 28 in each thrust member accommodates an adjusting screw 30 formed with a suitable head 32 for rotating it, said head having a forwardly directed shoulder 33 from which projects an unthreaded stud 34 shaped to enter a corresponding one of the holes 26 in the thrust ring 24. A set screw 36 in the thrust rod, with its axis normal to the adjusting screw 30, serves to hold the last-named screw in any position.

Referring next to Figs. 2 and 4, the rear ends of the rocket motors 12 are encircled by straps 38 formed partly of webs which may form fins 16, or to which fins are fastened. Plates 40, secured to the straps, preferably by welding, are bolted or otherwise secured to a disk 42, to maintain the proper positional relationship between the rocket motors. The disk may be formed with a central, circular orifice 44. A cylindrical hollow member 46 is formed with a rearwardly projecting hollow hub 48 fitting into the orifice 44 in the disk 42, and is externally shouldered at 50 to provide a forwardly projecting cylindrical portion 52, the diameter of which is such that it fits snugly but releasably into the rear end of the combustion chamber 20 to center it, that is, it fits closely enough to avoid play but not tightly enough to bind, so that it may fall out easily when it is to be discarded.

In assembling the carriage and the missile, the rear end of the combustion chamber 20 is slid over the cylindrical portion 52 of the member 46 and so placed that the clearance between the rear end surface of the missile and the forward surface of the shoulder 50 is of the order of one-eight to one-half inch, after which the adjusting screws 30 are advanced, with the studs 34 in the holes 26 in the thrust ring 24, until all the shoulders 33 bear equally firmly against the ring. This adjustment ensures that the missile is centered in and alined with the launching carriage, and that the thrust of the rockets will be applied evenly to the missile, without

strain on the thin wall of the combustion chamber.

In operation, the thrusts of the rockets will be applied to the tubes or rods 18 and thereby transmitted to the thrust ring 24, through screws 30. As already explained, these screws make it possible to adjust individually the lengths of the thrust transmitting members, so that they will bear evenly on the thrust ring.

Care must be taken that the rear fitting 46 slides freely in pipe 20 and that there is a gap at 50, that is, that the said rear fitting does not rest against the rear end surface of the pipe 20. This precaution ensures that no axial thrust is applied to the relatively weak pipe at this location.

The ultimate effect is that the resultant of the rocket thrusts is caused to act at substantially the center of mass of the entire assembly, resulting in less tendency to deflection, and absence of any appreciable jamming action at the rear end of the pipe 20. When the rockets are spent, the air drag on the rocket casings will cause the rocket unit to be left behind, while the missile proceeds forward, under its own jet power, slipping easily out of and off the launching carriage.

Having disclosed the invention by describing a preferred form thereof, it should be understood that this disclosure is provided purely for purposes of illustration and not as a limitation of the invention to all or any of the details thereof. The invention is defined solely in and by the following claims.

I claim:

1. A launching carriage for a missile, said carriage comprising a plurality of rockets having their axes substantially parallel to that of the missile, and arranged at uniform angular spacings about said missile axis, a rear centering member having a cylindrical portion releasably engaging the rear end of said missile, said rockets being secured at their rear ends to said centering member, and apertured means secured to the missile and located substantially in a plane transverse to the missile axis and passing through the center of mass of the entire assemblage, including missile and rockets, each rocket having a rigid thrust member extending from, and rigidly secured to, its forward end, each thrust member having its forward end engaged in a corresponding aperture in the apertured means and thereby being positioned, and all said thrust members bearing with substantially equal forces against said apertured means.

2. A launching carriage as defined in claim 1, wherein each thrust member is of adjustable length.

3. A launching carriage as defined in claim 1, wherein the apertured means is a rigid ring secured to the missile, and has a uniformly spaced series of holes therein, equal to the number of rockets.

4. A launching carriage as defined in claim 1, wherein each thrust member has screw threaded means at its forward end to provide accurate adjustment of the effective length of said thrust member.

5. A launching carriage as defined in claim 1, wherein the forward ends of all the rockets are interconnected by conduits to equalize the pressures in the rockets.

6. A launching carriage as defined in claim 1, wherein the rear centering member in addition to holding the rear ends of the rockets in proper position also is provided with fins for assisting in maintaining the rockets in straight flight.

7. The combination with a missile, of means for launching the missile, said means being separable from the missile and comprising a rocket device with a plurality of rockets having their axes substantially parallel to the axis of the missile for developing thrust forces, whereby separation of said means from the missile occurs upon failure of said thrust forces, and means for imparting the resultant of said forces uniformly to the periphery of said missile at substantially the center of mass of the missile and rocket device.

8. In combination with a missile, thrust-receiving means on the missile, and launching means for said missile said launching means being separable from the missile and comprising a rocket-thrust-developing device with a plurality of rockets having their axes substantially parallel to the axes of the missile whereby separation of said launching means from the missile occurs upon cessation of said thrust, and means for imparting said thrust to the thrust-receiving means, said last-named means being located at or near the center of mass of said missile and device combined so as to apply uniformly said thrust forces to the periphery of said missile.

9. In combination, a missile and a device for launching the said missile, said device comprising a plurality of rockets arranged about said missile and having their axes substantially parallel to that of the missile, a guide member engaging the missile near the rear end thereof, said rockets being secured to said guide member, thrust-receiving means secured to said missile and located near the center of mass of combined missile and device, and rigid thrust-imparting means releasably connecting the device to the thrust-receiving means.

10. The combination defined in claim 9, wherein the thrust-imparting means abuts the thrust-receiving means.

11. The combination defined in claim 9, wherein the guide member slidably engages the missile.

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