

Launching tube made from composite material

The invention relates to a launching tube for a launching device for a rocket, in which launching tube a rocket can be accommodated, which launching tube is made from a composite material.

Launching tubes and launching devices of this nature are known. An example which may be mentioned is a launching device comprising a canister in which a launching tube made from a composite material is accommodated. A canister in which four launching tubes can be accommodated is also known.

The launching tube forms a protection for the rocket, so that it is not damaged, rendering it unusable, during transport, for example. The launching tube also forms a protection for the surrounding structure of the launching device when the rocket is launched. During the launch, hot gases are released, which could damage the launching device. The launching tube guides the gases which are released to an opening from which they are discharged.

The known launching tubes can only be used once. After the rocket has been launched, they are of no further use.

The object of the invention is to provide a launching tube which is suitable for reuse. This object is achieved in that the inside of the launching tube is lined with a protective layer which provides protection against the high temperatures and the substances or gases which are released when a rocket is launched from the launching tubes.

In particular, the protective layer may comprise a phenolic glass, phenolic carbon, etc. The phenolic glass, etc forms a sacrificial layer which provides the possibility of using the launching tube a number of times to launch a rocket.

To save weight, the launching tube may comprise a wound fibre material which is impregnated with a resin.

During the launch of the rocket, relatively high pressures arise in the interior of the launching tube owing to the gases which are released. In order to be able to withstand these relatively high pressures, even with a small wall thickness, the cross section of the launching tube is rounded.

In particular, the launching tube may have two slightly curved walls, which walls, via rounded sections, adjoin a further slightly curved wall. However, completely planar walls are not ruled out. The advantage of this embodiment is that a plurality of launching tubes can be accommodated in a compact space next to one another, and slightly curved or planar walls limit the space required.

In this connection, the walls may adjoin an outwardly arched wall which is located opposite the further wall.

Furthermore, a tube or sleeve may be mounted on the inside in order for cables and the like to be led through.

The invention will now be explained in more detail with reference to an exemplary embodiment which is depicted in the figures and illustrates a holder with a rocket.

Figure 1 shows an exploded view of the launching device according to the invention.

Figure 2 shows a cross section through the attachment means according to the invention.

The launching device shown in Figure 1 comprises a launching tube 1 in which a rocket 2 can be accommodated.

At one end 3, the launching tube is closed off by means of a cover which is suspended from hinge 5. At the other end 6, the launching tube 1 has an opening through which the gases produced by the rocket can be discharged. During transport, the cover 4 is closed, and the other end is also closed off by means of seal 7.

The launching tube 1 has two parallel, flat side faces 8, which are connected at the bottom by bottom surface 9. At the top, the launching tube 1 has an arched top surface 10.

The rail 11 is attached to the inside of the arched top surface 10. As shown in Figure 2, this rail 11 comprises a closed box-shaped profile, which on the side facing towards the interior of the launching tube 1 has flanges 12, 13 which face away from one another.

A carrier 14 which, as shown in Figure 2, has complementary, inwardly facing flanges 15, 16, is attached to the rocket.

By the interaction between the flanges 12, 13 and 15, 16, the rocket is held in position in the launching tube 1 in such a manner that it does not come into contact with the walls 8-10.

On the other hand, the rocket can be displaced in the longitudinal
5 direction 1 of the launching tube, so that it can be launched without problems.

In order to fix the rocket 2 with respect to the rails 11 during storage and transport, a locking assembly 17 is provided.

The rail 11 is attached in particular to the inner saddle 18 which is shaped so as to correspond to the internal surface of the arched top wall 10. The
10 outer saddle 19 is arranged on the outside of the arched top surface 10. The top wall 10 is clamped in between the two saddles 18, 19. Inner saddle 18 and outer saddle 19 are attached to one another by means of bolts (not shown).

Outer saddle 19 is in turn attached to a frame (not shown), such as a canister, in which the launching tube is held.

15 In order for it to be possible to use the launching tube 1 a number of times, the internal surface of the walls 9-10 is lined with a phenolic glass, phenolic carbon and the like. The phenolic glass or phenolic carbon forms a so-called sacrificial layer which allows the launching tube 1 to be used a number of times for launching a rocket.

20 Cables, for example in order to operate the rocket, are able to run through the rail.

Claims

1. Launching tube (1) for a launching device for a rocket (2), in which launching tube (1) a rocket (2) can be accommodated, which launching tube (1) is made from a composite material, characterized in that the inside of the launching tube (1) is lined with a protective layer which provides protection against the high temperatures and the substances or gases which are released when a rocket (2) is launched from the launching tubes (1).
2. Launching tube according to Claim 1, in which the protective layer comprises phenolic glass, phenolic carbon and the like.
3. Launching tube according to Claim 1 or 2, in which the launching tube (1) comprises a wound fibre material which is impregnated with a resin.
4. Launching tube according to one of the preceding claims, in which the cross section of the launching tube (1) is rounded.
5. Launching tube according to Claim 4, in which the launching tube (1) has two parallel, substantially planar or slightly curved walls (8), which parallel walls (8), via rounded sections, adjoin a further substantially planar wall (9).
6. Launching tube according to Claim 5, in which the parallel walls (8) adjoin an outwardly arched wall (10) which is located opposite the further substantially planar wall (9).
7. Launching tube according to one of the preceding claims, in which a tube or sleeve is mounted on the inside, in order for cables and the like to be led through.

