United States Patent

Sigrist

[15] **3,640,179**

[45] **Feb. 8, 1972**

[54] LOADING TRAY FOR A ROCKET

[72] Inventor: **Hugo Sigrist**, Hinwil, Switzerland

[73] Assignee: **Werkzeugmaschinenfabrik Oerlikon-Buhrle AG**, Zurich, Switzerland

[22] Filed: **Jan. 28, 1970**

[21] Appl. No.: **6,476**

[30] **Foreign Application Priority Data**

Feb. 7, 1969 Switzerland 1883/69

[52] **U.S. Cl.** **89/1.801**, 89/1.803, 89/1.816, 89/45

[51] **Int. Cl.** **F41f 9/00**

[58] **Field of Search** 89/1.801, 1.816, 1.803, 33, 89/45

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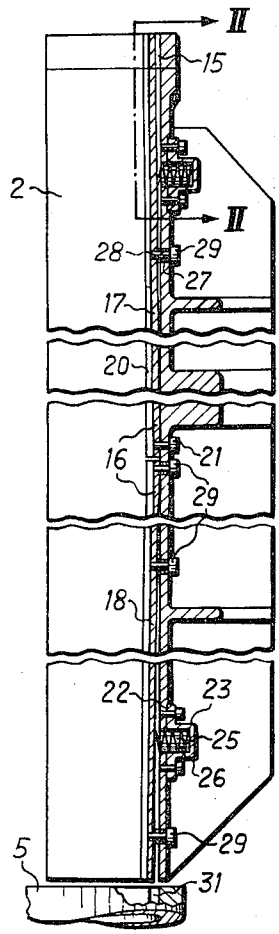
Primary Examiner—Samuel W. Engle
Attorney—Wenderoth, Lind & Ponack

[57] **ABSTRACT**

A loading tray for a rocket launcher having a longitudinally extending groove on the inside of the tray. A rail is mounted in the groove which may be sunk radially to the tray into said longitudinally extending groove. The rail has a guide groove for rockets. Spring elements are arranged between the base of the longitudinally extending groove and the two ends of the rail. The rail is fastened between the spring elements to the base of the groove.

3 Claims, 3 Drawing Figures



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SHEET 1 OF 2

Fig. 1

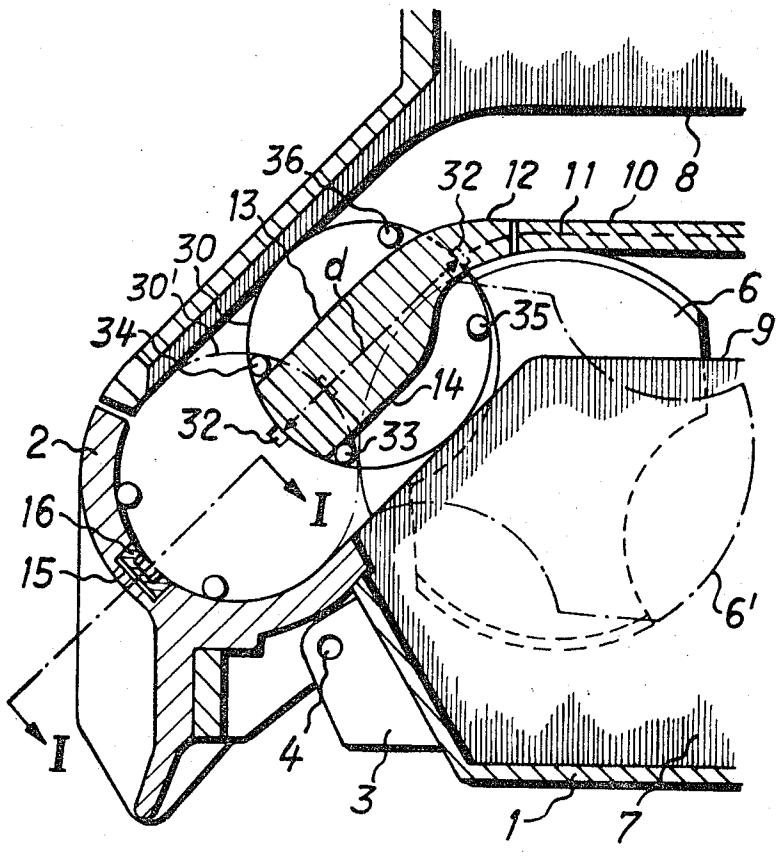
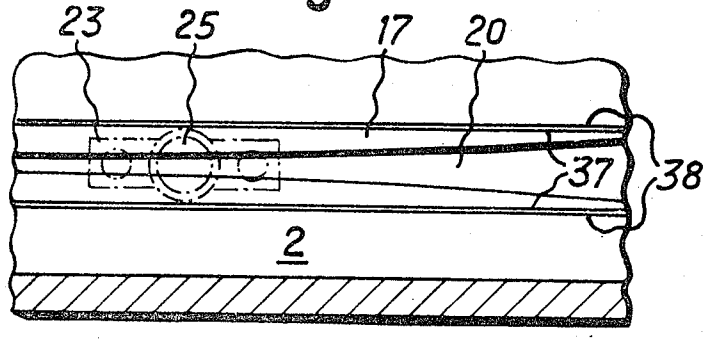


Fig. 3



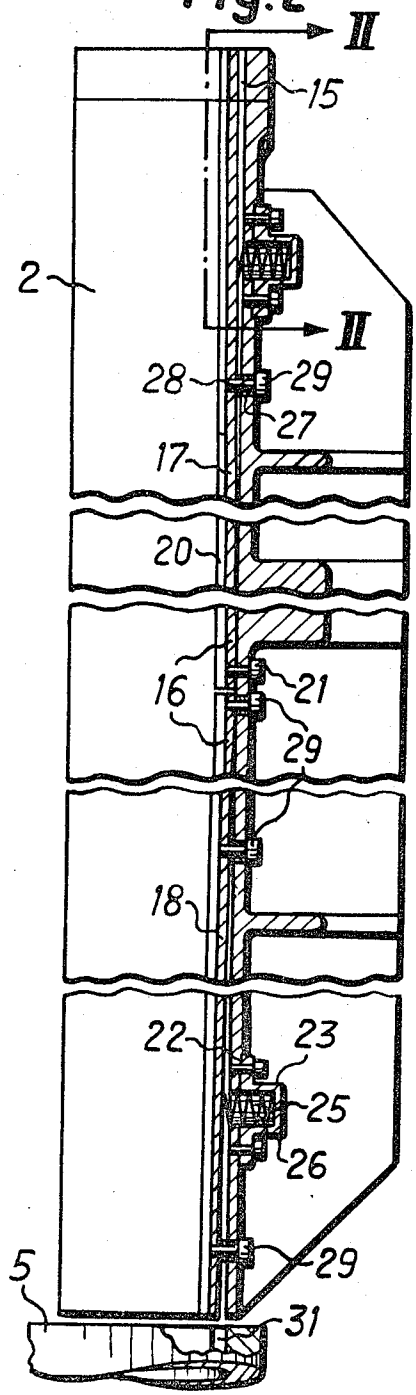
Inventor

Hugo Sigrist

By Wenderoth, Lind & Ponack

Attorneys

Fig. 2



Inventor

Hugo Sigrist

By Wanderath, Sind & Ponack
Attorneys

LOADING TRAY FOR A ROCKET

The invention relates to a loading tray for a rocket launcher, which tray has, on the inside, a groove extending longitudinally to guide the rocket. Such a loading tray is a half-cylinder which forms part of the loading chamber and surrounds the rocket in the launching position. The tray is coaxial with the launcher tube. After repeated use such loading trays become distorted along their length because of the thermal stresses caused by the large difference in temperature between the inner surface and the outer surface of the tray upon firing. The rear section of the tray which is subjected to intense strains by the explosion of propellant charge gases tends to sag outwardly. If, as is known, a guide groove is cut into the loading tray itself, the clearance between the rear end of the tray containing the groove and a rocket lying in the launching position can, after a number of launchings, be so great that the guide lug of the rocket does not fully engage with the guide groove. As a result, the correct guiding of the lug towards a helical groove cut into the launcher tube is not assured. If, at the commencement of launching, the lug is out of the guide groove, it can cause damage by jamming of the rocket in the loading chamber.

An object of the present invention is to guide the lug in the loading tray and overcome difficulties caused by the aforedescribed deformation.

A further object of the invention is to provide a loading tray which has on the inside, a longitudinally extending groove in which groove is fastened a rail which can be sunk radially to the tray into said longitudinal groove and which rail contains a guide groove.

With the above and other objects in view which will become apparent from the detailed description below, a preferred form of the invention is shown in the drawings, in which:

FIG. 1 shows a cross section through a loading tray including a part of the magazine of a rocket launcher;

FIG. 2 shows a longitudinal section along the line I—I of FIG. 1;

FIG. 3 shows a partial longitudinal section along the line II—II of FIG. 2.

With reference to FIGS. 1 and 2, the rocket launcher comprises a magazine housing 1, a loading tray 2 in the shape of a half-cylinder and a launching tube 5 linked coaxially with the loading tray. Braced between two mountings 3, attached to the magazine housing, is a rod 4 which runs parallel to the axis of the launcher tube 5. The loading tray 2 is pivotally mounted on the rod 4. Arranged adjacent to the rod 4 is a two-bladed conveyor roller 6.

Within the housing 1, in the walls 7, are guide surfaces 8, 9 which extend towards the loading tray and along which rockets, such as the rocket 30 in FIG. 1, are moved laterally. When the loading tray 2, is pivoted to the position shown in FIG. 1 which is its normal operating condition when firing is imminent the guide surfaces 8, 9 form continuous surfaces with the inner surface of the loading tray. Conveying means which are not shown and not described in more detail are provided, which shift the rockets laterally between the guide surfaces 8, 9 to the conveyor roller 6. The conveyor roller 6, driven anticlockwise with the conveying means, moves the rockets, such as the rocket 30 in FIG. 1, away from the conveying means into the launching position in the loading tray 2, like the rocket 30' in FIG. 1. The position of the conveyor roller 6 with regard to this rocket 30' is indicated in dot-dash lines in FIG. 1.

In the position shown in dot-dash lines, the conveyor roller 6 contacts with one of its convex surfaces the generated surface of the rocket 30' arriving for launching. In this position a loading chamber closed towards the housing 1 is formed by the conveyor roller 6 together with a pivotally mounted closing flap (not shown), which is swung against the convex surface thereof and the loading tray 2 around the rocket 30'.

A guide rail 10, which is connected rigidly to a back wall (not shown) of the housing 1 protrudes towards the tail of the rockets 30 between the guide surfaces 8, 9 has a plane of symmetry 11 which is substantially equidistant from each of the guide surfaces 8 and 9. An extension 12, forming a bend in front of the loading tray, connects guide surfaces 13, 14 to the guide rail 10. The extension 12 widens from its point of attachment to the guide rail 10, as shown in FIG. 1, to a multiple of the thickness of the guide rail 10. The surfaces 13, 14 terminate in two planes parallel to the guide surfaces 8, 9 adjacent to loading tray and are equidistant from these surfaces. The extension 12 protrudes towards the loading tray so that its extremity lies within the diameter of the rocket 30' lying in the loading tray 2. The rocket 30 in FIG. 1 has, on its tail surface, stop pins 33, 34, 35, 36 which project axially rearwards towards the guide rail 10, or the extension 12 respectively. These are arranged symmetrically with regard to the axis *d* of the rocket 30, and their spacing relative to this axis corresponds to the greatest distance of the surfaces 13, 14 from each other. Lying on the line of intersection of the axis *d* and a transverse axis of the rocket 30 in front of the tail surface thereof is an axis on which lie short twist lugs 32, which project beyond and are securely connected to the rocket body.

Arranged in the inner surface of the loading tray 2, along a generatrix of the half-cylinder, is a groove 15 with rectangular cross section. Inserted into the groove 15 is a rail 16, which has a cross section corresponding to the groove 15. The narrow sides (FIG. 3) of the rail 16 butt against the flanks 38 of the groove 15 and the upper surface of the rail 16 has a shape corresponding to the inner radius of the loading tray 2. A guide groove 20 extends along the entire length of the rail 16, in the center thereof. The depth of the guide groove 20 corresponds to the length of the twist lug 32 and the width of the guide groove corresponds to the diameter of the same.

The rail 16 is divided into a shorter rear part 17 and a longer front part 18. The guide groove 20 is, as shown in FIG. 3, widened relatively at the rear part 17 conically and symmetrically relative to the surface 11 to approximately twice the width of the said surface. One end of the part 17 is connected by a bolt 21 without clearance on the base of the groove 15 of the loading tray 2. One end of the part 18 is connected by a bolt 29 without clearance on the base of the groove 15 of the loading tray 2. The bolt 29 is passed through a spacing sleeve 28, which is movably mounted in a bore 27, opening into the groove 15, of the loading tray 2. The bolthead diameter 29 is greater than that of the spacing sleeve 28 and butts from the outside against the loading tray. Connected to the part 17 at a greater distance behind the bolt 21 is a bolt 29 passing through a bore 27 in the tray 2. Connected to the part 18 are several bolts 29 passing through bores 27 in the tray 2. The bolts 29 are surrounded by spacing sleeves 28. The length of these spacing sleeves 28 and bolts 29 increases with an increasing distance from the joint of the parts 17, 18 and the clearance between the rail 16 and the tray 2 increases from said joint to the ends of the tray 2.

In recesses 22 of the outside of the loading tray 2, behind the bolt 29 of the part 17 and behind the foremost bolt 29 of the part 18, holders 23 are connected securely to the loading tray 2. A blind hole 25 each passes from the base of the groove 15 through the loading tray 2 into the holder 23.

Inserted into the blind hole 25 is a spring 26, which is clamped between the holder 23 and the rail 16. Under the pressure of the springs 26, the rail 16 is raised from the base of the groove 15 rearwards in the part 17 and forwards in the part 18, and the boltheads 29 are adjacent to the loading tray. The launcher tube 5 has a helical groove 31 which corresponds in depth and width to the guide groove 20 and which starts at the rear end of the launcher tube 5 and is symmetrical with respect to the aforesaid surface 11.

The loading tray and associated parts operate as follows:

A rocket is moved by the conveyor roller 6 between the guide surfaces 8 and 9 from the guide rail 10 laterally towards the loading tray 2. When the rocket, such as for example the rocket 30 in FIG. 1, passes over the extension 12, the stop pins 33 to 35 cause, by impact against the guide surfaces 13, 14 a rotary motion of the rocket 30 about its axis. When the stop

pin 35 slips over the final piece of the bounding surface 14, the stop pins 35 and 36 are horizontal. The twist lug 32 lies with its axis theoretically on an extension of the plane 11 and is thus, shortly before the rocket 30 travels into the launching position of the rocket 30', adjusted to enter the guide groove 20. Any deviation, arising from play of the guide surfaces of the axis of the twist lug 32 from the plane 11 is taken into account by the conicity of the guide groove 20. The conveyor roller 6 continues to push the rocket towards the launching position. The twist lug 32 positioned within the guide groove 20 penetrates between the conically widened flanks of the guide groove 20 in the part 17, and the rocket 30 begins to press against the ends, projecting under the action of the springs 20 from the inner surface of the loading tray 2, of the rail 16 and to force the parts 17, 18 successively into the groove 15. The conveyor roller 6 moves the rocket as long as the impact edge of the roller still acts on the generated surface of the rocket. If, upon this movement, the rocket axis coincides with the axis of the launcher tube 5, then the rocket has reached the launching position as with rocket 30' (FIG. 1). At this instant, the impact edge of the conveyor roller 6 slides off on the generated surface of the rocket 30', the propelling of the rocket is terminated and the drive of the conveyor roller is released.

The conveyor roller 6 is arrested in the position shown in dot-dash lines, whereby it pushes the rocket 30' via its convex surface with a force directed towards the rail 16. In the launching position the rocket 30' is held down positively onto the two parts 17, 18 of the rail 16. If the loading tray 2 is in the original state, then the rocket 30' also rests positively in this loading tray, and the rail 16 furthermore rests, over its entire length, on the base of the groove 15. The boltheads 29 with the spacing sleeves 28 project outwardly from the loading tray 2.

If the loading tray 2 has experienced a thermal deformation, the clearance between the rear and the front end of the tray 2 and the rocket 30' has increased, and the rocket 30' rests on the middle portion of the loading tray 2. The parts 17 and 18 of the rail 16 are applied by the pressure springs 26, as before, positively against the rocket 30'. The rail 16, as an extension of the deformed loading tray 2 is guided by the flanks 38 of the groove 15 and align with the helical groove 31. The rail 16 thus forms for the twist lug 32 of the rocket 30' a guide groove which is parallel to the axis of the launcher tube, after said thermal deformation of the loading tray 2.

The correct guiding of the twist lug 32 is thus assured when the loading tray 2 has experienced a thermal deformation.

I claim:

1. A loading tray for a rocket launcher comprising a longitudinally extending groove having a base on the inside of said tray, a rail mounted in said groove, spring elements arranged between the base of said longitudinally extending groove and the two ends of said rail allowing said ends of the rail to be sunk radially to the tray into said longitudinally extending groove means for fastening said rail between said spring elements to said base of said groove in said tray and said rail having a guide groove for rockets.

2. A loading tray as claimed in claim 1 wherein said rail is guided by its faces on the flanks of said groove and bolts are connected securely to said rail having stops limiting the radial movement of said rail relative to said tray.

3. A loading tray as claimed in claim 2 wherein said rail comprises a first part and a second part, each of said parts being held yieldingly by a fastening member on said tray.

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