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Diehl Munitionssysteme GmbH & Co KG, 90552 Röthenbach

Artillery projectile with interchangeable payload

The invention concerns an artillery projectile as set forth in the classifying portion of claim 1.

The arrangement the general kind set forth is known as the artillery rocket system MLRS 1/2. The continuous rocket casing thereof can be equipped with canisters from the tail while it is still open, behind the ogive which is fitted with a time fuse. The canisters in turn are equipped with distribution units for the ejection of different armour-piercing active bodies such as for example bomblets or armour mines. Behind that axial stack of canisters the rocket is then equipped with its motor, the housing of which is equipped in the tail region with control rudders which can be deployed and which are curved parallel to the system axis. The flexibility of such a system is limited however because the rocket casing is in one piece from the ogive as far as the separation location for the connection of the discardable rocket motor. The steering properties of that artillery rocket are also only moderately good because, with a motor which is activated only for a short time after leaving the launch barrel, the rocket experiences a high level of acceleration into a comparatively flat trajectory. Termination of the mission, which is purely time-dependent, by way of the time fuse in the ogive does not allow the expectation of pin-point accuracy in target acquisition so that, when the time fuse responds with explosive discarding of the motor which has then long been burnt out, only scattering active bodies are to be deployed in a meaningful manner.

The technical object of the present invention is to provide a system which is more open in terms of the interchangeability of the warheads and which is distinguished in particular also by a great range with nonetheless accurately targeted delivery of the payload.

In accordance with the present invention that object is attained in that, in accordance with the combination of features in the main claim, the payload space is the entire central section of an artillery projectile which is to be ballistically launched and which after the apogee goes into a controlled gliding flight; wherein that section which accommodates very different payloads is disposed between a standard tail section which remains the same for all payloads and which determines the external ballistics immediately after leaving the barrel, and a standard tip section which also remains the same for all payloads and which in turn is provided with canard or nose-mounted control surfaces for a controllable glide and with navigation devices such as inertial and/or satellite navigation for payload delivery of the utmost possible pinpoint accuracy.

The central section which can be interchangeably inserted between those two standard end sections has in its hollow-cylindrical peripheral casing at least one warhead in the manner of target-seeking submunition, a bundle of bomblets to be spread, a high-energy warhead or a post-acceleratable bar penetrator. A suitably produced projectile casing portion of the central section is then flange-mounted to the standard bottom section and the standard tip section, for example being connected together by radial pins or by a kind of bayonet coupling. At any event the projectile has a unitary airframe for very different payloads and for that reason, because of unchanged external ballistics, is to be handled without any problem for firing from the artillery canon, irrespective of the payload which is to be fired at that time.

In regard to further details, developments and advantages of the structure according to the invention, besides the appendant claims, attention is also directed to the description hereinafter of a preferred embodiment of the structure according to the invention which is diagrammatically illustrated in the drawing without being true to scale, being limited to what is essential.

The single Figure of the drawing is a view in axial longitudinal section through a range-enhanced gliding projectile which is to be launched

ballistically, with an interchangeable payload section between standard end sections.

The diagrammatic view shows in longitudinal section a projectile 11 which is to be fired from an artillery canon, that is to say ballistically, and which is divided into three in the axial direction, namely it has a load section 14 which can be inserted between a tail section 12 and a tip section 13. The load section 14 is therefore no longer a loadable load space in a continuous projectile casing, but it embodies the completely interchangeable central region of the projectile 11 together with its wall 15.

The payload space 16 within the wall 15 of the central or load section 14 of the projectile 11, as mentioned above, can be equipped with different warheads and in particular with warheads for attack on hard-armoured target objects. A suitably produced load section 14 can then be equipped in the completion phase with the tail section 12 and the tip section 13 in order to complete the projectile 11.

The projectile 11 is fitted with stabilisation fins 17 which are oriented rigidly in parallel relationship with the axis and which comprise for example steel sheet and which are applied against the cylindrical external peripheral surface of the tail section 12, under a spring bias, until launch from the barrel. So that they are held in that slightly sub-calibre launch position, a cup-shaped cover 18 is pushed from the rear over the tail section 12 with those stabilisation fins 17 peripherally surrounding it. The hollow-cylindrical annular wall 19 prevents the stabilisation fins 17 which are applied against the cylindrical surface of the tail section 12 from becoming deployed.

A peripherally extending guide band 21 is inserted into a radially shallow, axially wide groove 20 provided in the external peripheral surface of the annular wall 19. This is designed as a so-called slip-through guide band 21, that is to say it is not non-rotatably connected to the projectile 11, in order to reduce the stabilisation spin which is produced when the projectile is fired from the barrel, by the rifling thereof, to about 10% of the natural value, because the projectile 11 is not intended to fly in a spin-stabilised mode, in an external ballistic phase, that is to say after leaving the mouth of the barrel, but is to be aerodynamically stabilised by the fins

17 which are then extended somewhat radially outwardly. In principle, to reduce that spin in the barrel it can admittedly also be provided that the annular wall 19 is caused to rotate with respect to the projectile 11, that is to say with respect to its tail section 12; however it is structurally easier for the cover 18 with the annular wall 19 to be fixed non-rotatably on the tail section and for the guide band 21 to be allowed to slip through in its groove 20.

When the tail section 12 leaves the mouth of the barrel, the bottom suction effect behind the cover 18 and the components of the dynamic pressure forces, which act on its annular wall 19 in parallel relationship with its axis, cause the annular wall 19 to be displaced axially rearwardly and finally cause it to be entirely pulled off the tail section 12, thereby releasing the stabilisation fins 17, which are still in a condition of bearing against the external periphery of the tail section 12, for radial extension thereof. That deployment effect can be implemented about axes which are parallel to the projectile axis, under the effect of centrifugal force; however, as already mentioned, it is more appropriate for the stabilisation fins 17 to be made from spring plates which are each rigidly connected (for example riveted) to the tail section 12 along an edge and which, upon being released, possibly also assisted by a flexural spring, are released from the condition of being held in contact against the tail section 12 by the annular wall 19 into a position of radially projecting in a curved configuration parallel to the longitudinal axis 22 of the projectile.

Like the tail section 12 the tip section 13 is also designed as standard independently of the layout of the load section 14. It is provided with canard or nose-mounted gliding wings 23 which emerge from the contour of the ogive 24 for example by a pivotal movement as soon as the projectile 11 has passed through its apogee on its initially ballistic launch trajectory. The wings 23 serve both for the gliding phase and also for steering towards the target. Initially there is a transition from the ballistic descent path following the apogee, into an extendedly controlled glide in order in that way to achieve a correspondingly greater range as a consequence of a markedly shallower path of descent. At the same time the

projectile is steered towards the predetermined target point by means of an inertial or satellite navigation system. That flight guidance is effected by pivotal movement of the gliding wings 23 out of the neutral position, parallel to the generatrix of the ogive 24, by means of a steering unit 25 which in turn is actuated by way of a navigation device 26 in order then to transfer from the shallow glide into a steep attack trajectory with the projectile 11 shortly before flying over the predetermined target point. Finally, closely above the target, from that steep attack trajectory, an ejection device 28 is activated by a fuse 27 which acts for example in distance-oriented relationship with respect to the surrounding terrain, in order to separate the tip section 13 from the load section 14 and to empty the payload space 16 by way of that separation location directly into the more closely confined target area.

Therefore in accordance with the invention an inexpensive terminal phase-steerable artillery munition of markedly increased range and acquisition accuracy for use which is universal in terms of variable payload under aerodynamic conditions which are always the same by virtue of maintaining the external-ballistic projectile coefficients is afforded if, in an aerodynamically stabilised gliding projectile 11 inserted between a standardised tail section 12 which initially determines the external ballistics and an also standardised tip section 13 which in the terminal phase determines range and precision is a load section 14 which connects the two contours of said sections together and which can be equipped with very different warheads which in particular are optimised against hard targets. For launch into an aerodynamically stabilisedly ballistic trajectory the tail section 12 is provided with super-calibre stabilisation fins 17 which in the barrel, in the firing position of being applied against the peripheral surface of the tail section 12, have an annular wall 19 engaging thereover, the annular wall 19 being provided with a slip-through guide band 21 for initial reduction of spin while still in the barrel. Preferably immediately after passing the apogee of the ballistic trajectory nose-mounted gliding wings 23 are extended from the tip section 13, by means of which wings 23, by way of a steering unit 25, a transition is implemented from the descending

path of the ballistic trajectory into a shallower gliding path of therefore greater range, from which finally under navigational control there is a steeper descent into a more closely predetermined target area into which the load section 14 delivers its payload.

CLAIMS

1. An artillery projectile with an interchangeable payload characterised in that

in a projectile (11) arranged between a standardised tail section (12) and a standardised tip section (13) and interconnecting the external contours of those two standard sections (12, 13) is an interchangeable load section (14) which can be fitted with different payloads.

2. A projectile according to claim 1 characterised in that the tail section (12) includes the bottom of the projectile and stabilisation fins (17) which can be radially extended in a super-calibre configuration.

3. A projectile according to claim 2 characterised in that, when the stabilisation fins (17) are applied against the external peripheral surface of the tail section (12), the tail section (12) is surrounded by an annular wall (19) which, upon launch from the barrel, upon enablement of deployment of the stabilisation fins (17), is pulled off rearwardly from the tail of the projectile (11) parallel to the axis.

4. A projectile according to claim 3 characterised in that the annular wall (19) is surrounded by a guide band (21).

5. A projectile according to claim 4 characterised in that the guide band (21) is fitted into a groove (20) extending around the annular wall (19), the guide band being adapted to controlledly slip through said groove.

6. A projectile according to one of claims 3 to 5 characterised in that the annular wall (19) is the wall of a cup-shaped cover (18) which is pushed at the tail end on to the tail section (12) with the stabilisation fins (17) folded against the wall thereof.

7. A projectile according to one of the preceding claims characterised in that the tip section (13) is equipped with gliding wings (23) which can be extended from the contour of the ogive (24).

8. A projectile according to claim 7 characterised in that provided in the tip section (13) is a navigationally controlled steering unit (25) for canard gliding wings (23).

9. A projectile according to one of the preceding claims characterised in that provided in the tip section (13) is a separating device (28) activatable by a fuse (27) for opening an ejection opening with a connection between the load section (14) and the tip section (13) being exploded open.