

ARRANGEMENT FOR SUPPORTING MORTAR SHELL INTO BARREL

The invention relates to an arrangement for supporting a mortar shell into the barrel of a breech-loading mortar weapon, said arrangement
5 comprising a support piece, with a rim flange, to be attached to the tail of the mortar shell.

A problem with mortars used on different armored self-propelled chassis concerns the ability of the device to defend itself. If a heavy mortar is mounted on a chassis, it is not usually easy to mount on it sufficiently heavy
10 artillery weapons for defense purposes. Lighter automatic weapons, on the other hand, are not always sufficient against antitank equipment or other artillery at a longer distance. In some cases it would be necessary to have the possibility to fire a smooth-bore mortar also horizontally with direct fire, which is not normally possible. Any movement of the shell in the barrel can also
15 cause the shell not to go off when needed. One solution to this problem is proposed in the U.S. Patent 5,503,080, in which a separate guiding and attachment element is used in the tail of a mortar shell. Said solution includes a separate guiding element furnished with grooves dimensioned according to the tail of the shell, the tail being pushed into the grooves in such a way it is
20 attached to the guiding element with a friction joint. A problem with this solution is that the fastening of the support piece is not reliable during handling, the operational reliability of the shell being thus insufficient. The application of said solution also requires very precise measures of the tail of the shell and its support piece, in order for the shell to function at least
25 somewhat reliably.

An object of the present invention is to provide an arrangement which enables a mortar shell to be held securely and reliably in a correct position in a barrel of a breech-loading mortar weapon and ensures its reliable and secure operation under all circumstances.

30 An arrangement of the invention is characterized in that said arrangement comprises, between a support piece and the tail of a mortar shell, a connecting element providing a mechanical joint, which enables the support piece to be attached to the tail of the mortar shell, and that the support piece includes a firing member, with which the actual primer can be fired to
35 discharge the mortar shell.

An essential idea of the invention is that the support piece is

arranged to the shell with a mechanical joint, such as a thread or similar, provided by a separate connecting element, which is of such material and structure that when the mortar shell is fired, the connecting element between the mortar shell and the support piece fractures. Another essential idea of the invention is that the support piece comprises a firing member, which transfers the firing of the weapon to the actual primer of the mortar shell.

An advantage of the invention is that after the support piece is arranged to the mortar shell, the joint between them is firm and holds the mortar shell reliably and securely in place in a correct position in the barrel of the weapon, irrespective of the position of the barrel. Another advantage of the invention is that it allows using existing mortar shells without changes made to the mortar shell itself or to the charging system. A further advantage of the invention is that the support piece is light and inexpensive. One more advantage of the invention is its convenience of use in sliding breech lock wedge type based solutions, in which the sealing and the firing of the mortar shell would be problematic.

The invention will be described in greater detail with reference to the attached drawings, in which

Figure 1 is a schematic view of an arrangement of the invention arranged to a mortar shell and

Figures 2a - 2c are schematic, enlarged and partly cross-sectional views of embodiments of an arrangement of the invention.

Figure 1 is a schematic view of a mortar shell 1, known per se, comprising a tail tube 2. At the rear end of the tail tube 2 there are fins 3, which guide the flight of the mortar shell. Their structure and construction are commonly known per se, so their previously known embodiments need not be clarified in greater detail.

Figure 2a shows a schematic, partly cross-sectional view of an embodiment of an arrangement of the invention. The tail tube 2 of the mortar shell contains a propelling charge 4, which is used to expel the mortar shell from the barrel. For the firing of the propelling charge 4, a primer 5 is arranged to the end of the tail tube 2 with a separate attachment piece 6 provided with threads. Normally, when a mortar is used to fire mortar shells, a firing pin of the mortar strikes a primer 5 which fires the propelling charge 4, thereby expelling the mortar shell from the barrel.

The Figure also shows a separate connecting element 7 with a thin

flange 7a. The flange 7a is between the tail tube 2 and the attachment piece 6 in such a way that the attachment piece 6 attaches the connecting element 7 to the mortar shell. The connecting element 7, in turn, has a thread 7b, to which the separate support piece 8 is attached with a corresponding thread 8a. The support piece 8 resembles a short case end with a cylinder part extending round the fins 3 in such a way that when the mortar shell is in the barrel of the weapon, it is in a substantially direct and central position parallel to the barrel. The support piece also has a rim flange 8b, which sets in the groove at the rear part of the weapon's barrel, holding the mortar shell in a correct position in the barrel, irrespective of the position of the barrel, at the same time as the cylinder part seals the barrel. The support piece 8 further includes a firing member 9, which in this embodiment comprises an intermediate firing pin 9a and an electrical primer 9b. The intermediate firing pin 9a is normally kept in its place by a separate closing plate or a similar locking member 10, which prevents the intermediate firing pin from moving until the electrical primer is fired, after which it yields so as to enable the intermediate firing pin to strike the primer 5 of the mortar shell and thereby fire the propelling charge 4 of the mortar shell. As the propelling charge of the mortar shell is fired, the flange 7a of the connecting element 7 fractures and comes off the connecting element and the mortar shell is expelled from the barrel while the support piece 8 and a major part of the connecting element 7 stay in place. Instead of an electrical primer, it is naturally possible to use a conventional primer, which the weapon's firing pin strikes upon discharging, thereby firing, with the intermediate firing pin 9a, the actual primer 5 of the mortar shell.

Figure 2b shows another embodiment of an arrangement of the invention. In this embodiment the attachment piece 6 has a thread 6a on its outer surface. The support piece 8 correspondingly has on its outer surface a thread 8a with preferably the same dimensions. The connecting element 7 in this case is a sleeve-type element connecting the attachment piece 6 and the support piece 8 to each other. The connecting element 7 is in this case of such material that its threads 7b at the primer end of the attachment piece 6 fracture and come off or are deformed in such a way that the mortar shell is easily expelled when the charge is fired. If desired, the connecting element 7 can also be provided with a weakened section 11, where the connecting element 7 can fracture. This can also be used in a solution according to Figure 1 and in

other arrangements of the invention possibly implemented.

Figure 2c shows a third embodiment of the invention, in which firing is not achieved using a separate primer. The firing member in this case only comprises the mechanical firing pin 9a without a separate primer, and the
5 locking member 10 ensures that the pin is kept in place so that only when the firing pin of the weapon strikes the head of the intermediate firing pin 9a, it strikes the primer of the mortar shell, firing thus the charge of the mortar shell. The rear end of the intermediate firing pin 9a is in this case locked, e.g. with a
10 locking ring 12 located in a groove behind the firing pin 9a and preventing it from falling off from its place.

The above description and the drawings of the invention only represent an example of it, the invention not being restricted to it. Connecting elements can be shaped in different ways and manufactured of different materials, such as plastics, different composition metals, etc. An essential
15 feature is that the support piece is attached to the mortar shell with a mechanical joint, preferably with a thread, in such a way that they are kept firmly together before the firing. It is also essential that as the mortar shell charge is fired, a part of the attachment piece fractures or is deformed in such a way that the mortar shell is detached from the support piece. Yet another
20 essential feature is that the connecting element is strong enough to keep the support piece sufficiently firmly attached to the mortar shell during other handling of the mortar shell.



CLAIMS

1. An arrangement for supporting a mortar shell into the barrel of a breech-loading mortar weapon, said arrangement comprising a support piece, with a rim flange, to be attached to the tail of the mortar shell, characterized in that said arrangement comprises, between the support piece and the mortar shell tail, a connecting element (7) providing a mechanical joint which enables the support piece (8) to be attached to the tail of the mortar shell, and that the support piece includes a firing member (9), with which the actual primer (5) can be fired to discharge the mortar shell.
2. An arrangement according to claim 1, characterized in that the connecting element (7) has a flange-type part, which can be attached to a tail tube (2) of the mortar shell (1) with an attachment piece (6) attached to its end, and that the support piece (8) and the connecting element (7) have threads (7b, 8a) that fit together, enabling the support piece to be attached with a thread to the connecting element (7).
3. An arrangement according to claim 2, characterized in that a flange (7a) of the connecting element (7) is dimensioned so as to fracture when the mortar shell is fired.
4. An arrangement according to claim 1, characterized in that the attachment piece (6) of the tail (2) of the mortar shell (1) has a thread (6a); that the support piece (8) has a thread (8a) for attaching it and that the connecting element (7) is a sleeve-type element with a thread (7b) that fits both to the attachment piece (6) and to the support piece (8) so as to enable the support piece (8) and the mortar shell (1) to be attached to each other with the connecting element (7).
5. An arrangement according to claim 4, characterized in that the connecting element (7) is provided with a weakened section (11), such as a groove round the element, to make the element fracture at the weakened section when the mortar shell is fired.
6. An arrangement according to claim 4, characterized in that the connecting element (7) is made of such material that its threads (7b) are fractured or deformed when the mortar shell is fired.
7. An arrangement according to any one of the preceding claims, characterized in that a firing member (9) comprises a separate intermediate firing pin (9a); that a closing member is provided with a space where the intermediate firing pin (9a) can move in such a way that it reaches



the primer (5) of the mortar shell (1) to strike it and that the intermediate firing pin (9a) is prevented with a separate locking member (10) from moving towards the primer (5) of the mortar shell, said locking member yielding or fracturing from the impact of a force striking the intermediate firing pin (9a),
5 allowing the intermediate firing pin (9a) to strike the primer (5).

8. An arrangement according to claim 9, characterized in that in addition to the intermediate firing pin (9a) the support piece comprises a primer (9b) which, when it is fired, makes the intermediate firing pin (9a) strike the primer (5) of the mortar shell.