Jan. 7, 1958 A. E. SALORANTA ET AL 2,818,780

COUPLING DEVICES OF MORTAR-TYPE GUNS

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FIG. 1.

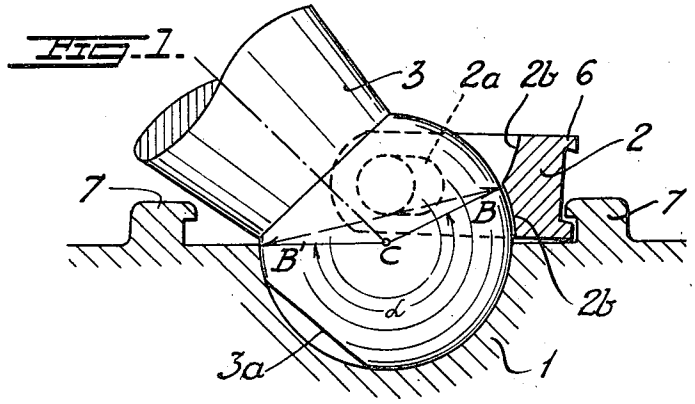
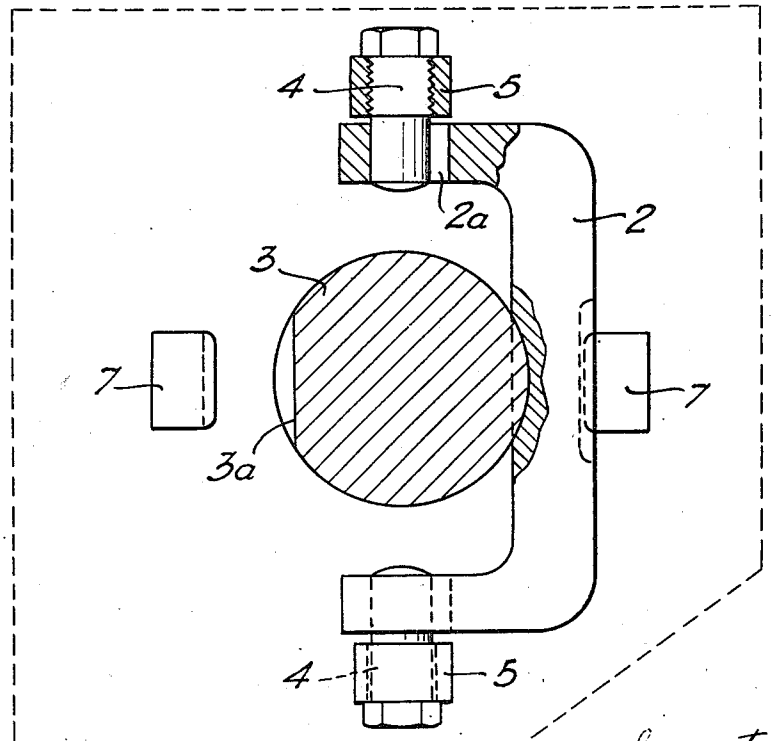


FIG. 2.



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FIG. 3.

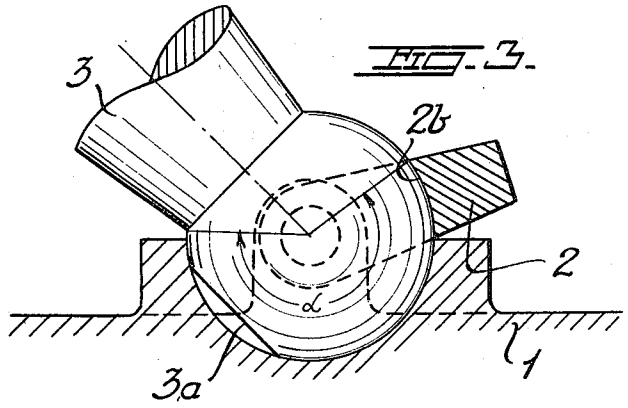
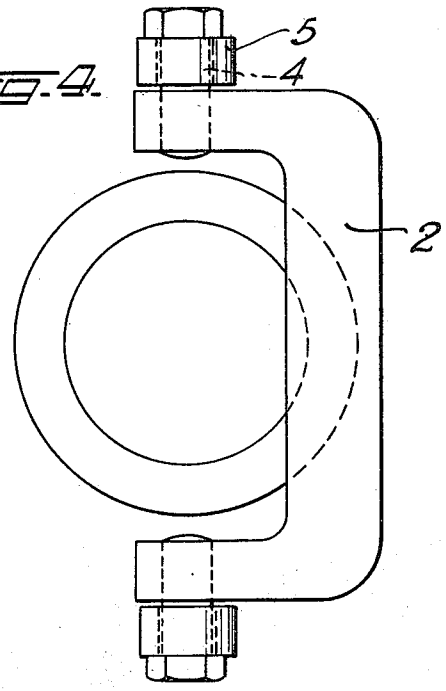


FIG. 4.



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COUPLING DEVICES OF MORTAR-TYPE GUNS

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FIG. 5.

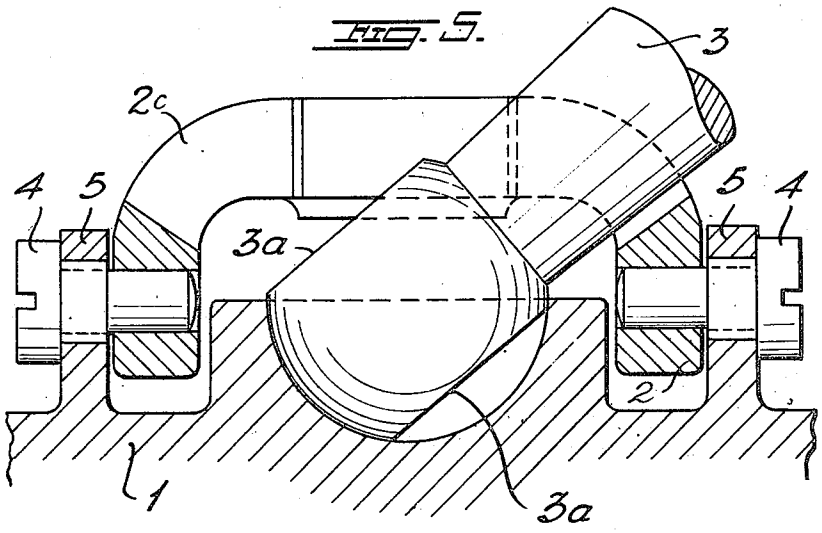
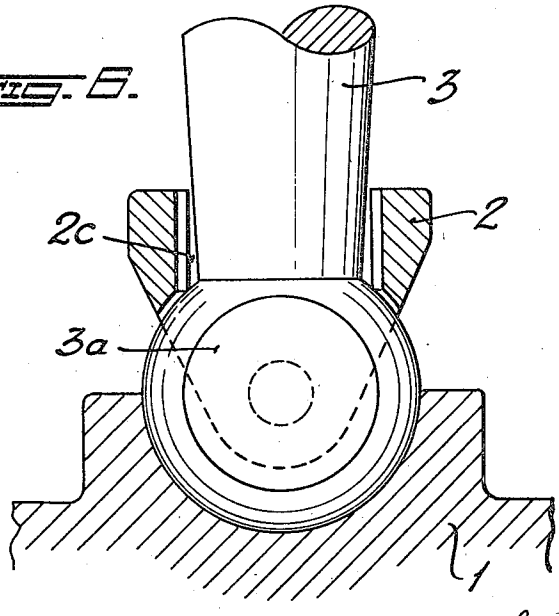


FIG. 6.



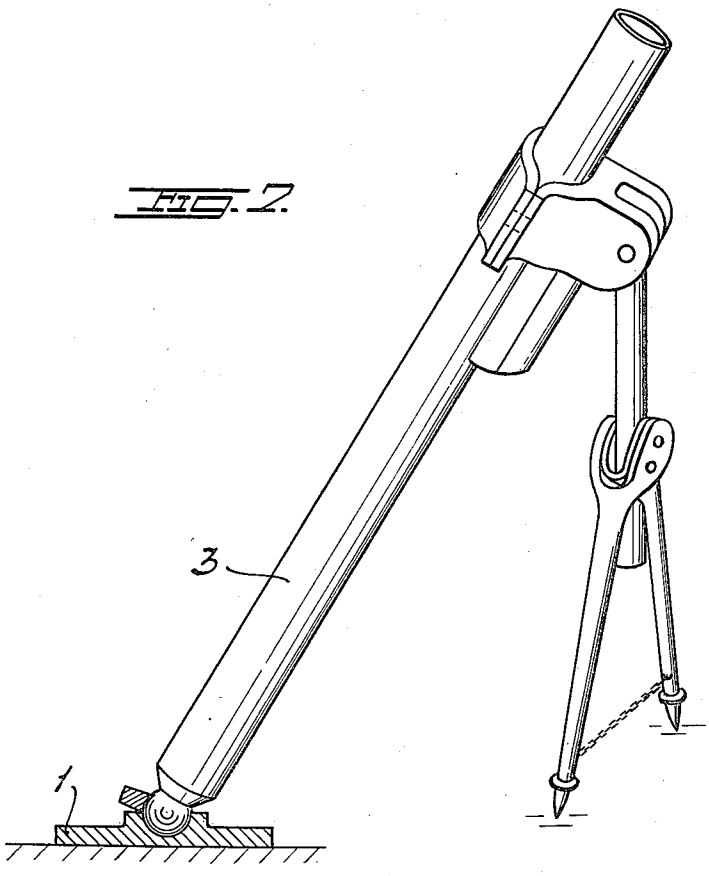
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COUPLING DEVICES OF MORTAR-TYPE GUNS

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FIG. 7.



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COUPLING DEVICES OF MORTAR-TYPE GUNS

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Application December 27, 1954, Serial No. 477,848

6 Claims. (Cl. 89—37)

This invention relates to a coupling mechanism for mortar-type guns of the class in which the gun barrel has a ball-shaped pivot at its rear end, which is flattened on one side or on two sides, preferably opposite to each other, and in which a base member upon which the gun barrel is adapted to stand, generally made as a plate which could be called a ground plate, being provided with a socket shaped as a segment of a sphere corresponding to the ball-shaped end pivot of the gun barrel for receiving the same.

In mortars of this class and of the construction generally used there are two lugs provided on opposite sides of the socket and formed so as to merge in the material bounding the socket, the arrangement being such that the end pivot can be inserted between the two lugs when presenting the flattened sides towards the same, but when rotated through a certain angle cannot be withdrawn from the ball socket, because the lugs protrude over the ball-shaped portion of the end pivot and serve as locking means.

However, these well-known locking lugs cause the disadvantage that the sector within which the direction of the fire can be varied horizontally without change of the position of the base member or ground plate, is limited to an angle of few degrees.

The object of the invention is to provide an improved mortar arrangement which by simple means secures a reliable coupling of the gun barrel with the base member or ground plate and by which the direction of the fire easily can be varied within a horizontal sector extending nearly over the entire horizon, and, in any event over more than 180°, no change of the position of the base member or ground plate being necessary within said sector.

This is, according to an essential feature of the invention, attained by the provision of a rockable, rigid coupling element mounted on the base member or ground plate at points on opposite sides of the socket for rocking movement on an axis extending above the socket in a perpendicular plane including the centre of the socket, said coupling element having a concave spherical surface for contacting the ball-shaped end pivot, which contact surface together with the inside of the socket covers a centric angle greater than 180°, for holding the end pivot in connection with the base member or ground plate.

Further objects and features of the invention will appear from the following description when read in conjunction with the accompanying drawings in which three embodiments of the invention are illustrated by way of example, and in which:

Fig. 1 shows a vertical cross-section through the ball

socket of the ground plate together with the ball-shaped end pivot of the gun barrel of the mortar and a coupling device according to the first embodiment of the invention, while Fig. 2 is a corresponding plan. In this embodiment, the ground plate is of the type in which the centre of the ball socket is on a level with the upper side of the ground plate;

Fig. 3 shows a cross-section through the arrangement according to the second embodiment, said cross-section being similar to that of Fig. 1, while Fig. 4 is plan corresponding to Fig. 3. In this embodiment, the ground plate is of the type in which the centre of the ball socket lies at a distance above the upper side of the ground plate;

Figs. 5 and 6 are two perpendicularly related elevations of the third embodiment, partly in a cross-section, this embodiment being in principle similar to that of Figs. 3 and 4 but modified in some respects;

Fig. 7 illustrates a well-known arrangement of a mortar together with leg support and ground plate, the last-mentioned member being provided with a coupling device according to Figs. 3 and 4.

In all three embodiments, reference numeral 1 indicates the ground plate of the mortar, 2 is a bail constituting the rockable coupling element, 3 the ball-shaped pivot provided on the lower or rear end of the gun barrel, 4 two journals constituting the axis of rocking of the coupling bail, and 5 lugs on the ground plate, in which said two journals are screwed and which may be ears welded to the ground plate. In the first two embodiments the ball-shaped end pivot has only one flattened surface 3*a*, while in the third embodiment two opposite flattened surfaces 3*a* are provided.

In the embodiment according to Figs. 1 and 2, the axis of rocking of the coupling bail 2 extends on a level higher than the centre C of the ball socket, said centre being substantially on a level with the upper surface of the ground plate. Thus, the axis of rocking extends in a plane approximately at right angles to the ground plate, which plane includes also the centre of the socket. Moreover, the ground plate has two locking members in the form of stationary lugs 7 on opposite sides of the ball socket, which lugs may be welded to the ground plate. Said lugs are provided for locking the coupling bail in either one of two end positions of the bail when rocked down upon the ground plate, preferably by engagement of the locking lugs with either of two corresponding projections 6 on the coupling bail. The bail is mounted with a free motion on the journals 4 such that the bail, when the gun barrel has been removed from the ground plate, can be moved to and from engagement with the respective locking lug 7 by a sliding motion along the surface of the ground plate, so that the bail can be shifted over from one position to the opposite one. Preferably, said free motion or play is provided by mounting the bail on the journals 4 by means of elongated apertures 2*a*. The bail has two concave spherical surfaces 2*b* facing towards the ball socket and provided for contacting the ball-shaped end pivot of the gun barrel. Said contact surfaces have the same radius of curvature as the ball socket and they are disposed such that in one end position of the bail one contact surface 2*b* constitutes a prolongation or extension of the socket at one side of the same and in the other end position the other contact surface 2*b* constitutes an extension of the socket at the opposite side of the same.

The device according to Figs. 1 and 2 is used and acts in the following manner:

Prior to the mounting of the gun barrel upon the ground plate the coupling bail is set to engagement with one of the two locking lugs **7**, as will appear from the drawing. Now, the gun barrel is coupled with the ground plate by inserting the end pivot into the ball socket, the end pivot during this insertion being held in such a position that the flattened surface **3***a* faces towards the middle portion of the bail. Then, the gun barrel is rotated through an angle such that the flattened surface is directed from the middle portion of the bail, as illustrated in Figs. 1 and 2. Thereby, the gun barrel is locked so that it cannot raise from its engagement with the ground plate. Evidently, the ball socket and the curved contact surface on the bail together must enclose a centric angle α of more than 180°, in other words the distance B—B′ in Fig. 1 must be smaller than the diameter of the ball-shaped end pivot, for securing the connection of the gun barrel with the ground plate. By raising the upper portion of the gun barrel together with leg support and displacing the same the horizontal direction of the gun can be varied within a sector which is larger than 180°, in the embodiment illustrated in Figs. 1 and 2 approximately 230°, the flattened surface always facing in the front direction, that is, the direction of firing, and no changes of the position of the ground plate being necessary. With the exception of such angular position of the gun barrel, in which the same can be withdrawn from the ground plate, the horizontal sector in which the direction of fire can be varied is limited only by the fact that the neck of the end pivot in certain angular positions will contact the bail. When it is desired to direct the gun barrel within the remaining sector of the horizon, the gun barrel is rotated until the flattened surface is exactly in front of the middle portion of the bail, so that the gun barrel can be withdrawn from the ball socket of the ground plate. Then, the bail is shifted over to its opposite position and the gun barrel is again inserted and locked, as already described.

In the embodiment according to Figs. 3 and 4, the axis of rocking the coupling bail **2** extends through the centre of the ball socket, said centre preferably lying higher than the upper side of the ground plate, especial stationary locking means **7** for the coupling bail being superfluous, and so are also projections **6**. Nor is it necessary to mount the bail slidably on the journals **4**. In this embodiment the bail has only one single contact surface **2***b*, constituting a prolongation of the surface of the ball socket at one side or the other of the same.

In the embodiment according to Figs. 5 and 6, the laterally widened coupling bail **2** is provided with a slot **2***c* extending in parallel with the axis of rocking. The neck of the end pivot **3** extends through said slot which thereby embraces the neck from opposite sides. Thus, the bail takes part in the movement of the end pivot when the gun barrel is turned perpendicularly to the bail. The end pivot is flattened at two opposite sides, as indicated by **3***a*.

Also the embodiments according to Figs. 1 to 4 may be used in connection with mortars in which the ball-shaped end pivot is flattened at two opposite sides. The conditions are similar to those described with reference to Figs. 1 to 4, except that the gun barrel must be rotated maximally only 90° for being withdrawn or assembled.

It should be observed that a device according to the invention can be utilized also in connection with ground plates already adapted for use. When the end pivot of the associated gun barrel has two flattened surfaces, one of said surfaces can be filled up by a suitably shaped body, if required.

It should be understood that the invention is not restricted to the embodiments illustrated which may be modified without exceeding the scope of the claims.

What we claim is:

1. A coupling device for mortar-type guns having a gun barrel provided with a ball-shaped end pivot at its rear end, which is flattened on at least one side, and a base member upon which the gun barrel stands, said base member being provided with a socket, shaped as a segment of a sphere corresponding to the ball-shaped end pivot of said barrel, for receiving the same, said coupling device comprising a rockable, rigid coupling element mounted on said base member at points on opposite sides of said socket for rocking movement on an axis extending above said socket in a plane including the center of the socket, said coupling element having a concave spherical surface for contacting the ball-shaped end pivot, which contact surface together with the inside of the socket covers a centric angle larger than 180°.

2. A coupling device in mortar type guns having a gun barrel provided with a ball-shaped end pivot at its rear end, said end pivot being flattened on at least one side, and a base member upon which said gun barrel stands, said base member being provided with a socket shaped as a segment of a sphere corresponding to the ball-shaped end pivot of said barrel for receiving the same, said coupling device comprising a rockable coupling bail mounted on the base member at points on opposite sides of said socket for rocking movement on an axis extending over the center of said socket and on a level higher than said center, said coupling bail having two concave spherical surfaces for contacting the ball-shaped end pivot, each of said contact surfaces together with the inside of said socket covering a centric angle larger than 180°, and two locking members provided on opposite sides of said socket for locking said coupling bail in either one of two end positions of said coupling bail when rocked down upon the base member.

3. A coupling device as claimed in claim 2, in which said locking members are stationary lugs on said base member, and the coupling bail is mounted with a free motion on journals on the base member such that, upon removal of the gun barrel from the base member, the coupling bail can be moved to and from engagement with the respective locking lug.

4. A coupling device for mortar-type guns having a gun barrel provided with a ball-shaped end pivot at its rear end, said pivot being flattened on at least one side, a base member upon which said barrel stands when assembled, said base member being provided with a socket, shaped as a segment of a sphere corresponding to the ball-shaped end pivot of said band for receiving the same, said coupling device comprising a coupling bail rockably mounted on said base member at points on opposite sides of said socket for rocking movement on an axis extending through the center of said socket, said coupling bail having a concave spherical surface for contacting the ball-shaped end pivot, which contact surface together with the inside of said socket covers a centric angle larger than 180°.

5. A coupling device for mortar type guns having a gun barrel provided with a ball-shaped end pivot at its rear end, said pivot being flattened on at least one side, a base member upon which said barrel stands, said base member being provided with a socket, shaped as a segment of a sphere corresponding to the ball-shaped end pivot of said gun barrel, for receiving the same, said socket having its center at a distance above said base member, said coupling device comprising a coupling bail rockably mounted on said base member at points on opposite sides of said socket for rocking movement on an axis extending through the center of said socket, said coupling bail having a concave spherical surface for contacting said ball-shaped end pivot, which contact surface together with the inside of the socket covers a centric angle larger than 180°.

6. A coupling device for mortar-type guns having a gun barrel provided with a ball-shaped end pivot at its rear end having a neck portion, said pivot being flattened

at two opposite sides, a base member upon which said gun barrel stands, said base member being provided with a socket shaped as a segment of a sphere corresponding to the ball-shaped end pivot of said barrel for receiving the same, said coupling device comprising a coupling bail rockably mounted on said base member at points on opposite sides of said socket for rocking movement on an axis extending through the center of said socket, said coupling bail having a concave spherical surface for contacting said ball-shaped end pivot, which contact surface together with the inside of the socket covers a centric angle larger than 180°, said coupling bail also being provided with a slot extending parallel with the axis of rocking and embracing said neck portion of said end pivot from opposite sides.

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