

Mount and weapon barrel comprising a mount

The invention relates to a mount for fixing an object in a weapon barrel.

Weapon barrels are used on military ships to receive and eject objects. A weapon barrel is understood to mean a tube of round cross section in a first approximation. Typical weapon barrels are, for example, torpedo tubes or ejection apparatuses for decoys or sonar devices. According to the invention, objects comprise weapons such as torpedoes, missiles, mines and decoys, but also stowage containers. Stowage containers in the context of this invention are stowage containers as are used, for example, in submarines for discharge by way of torpedo tubes. Said stowage containers serve to transport equipment articles, for example, for divers and to be ejected in the case of use, in particular even under water, from a submarine. In order to mount said objects in the weapon barrel in a stable manner, the objects have a fixing apparatus on the object case. In the case of torpedoes, said fixing apparatus is typically called a holding nipple. The weapon barrel preferably has a rail in the interior, in which rail the fixing apparatus can run. This prevents a rotation of the object. In order to also prevent the undesired translation of the object, the fixing apparatus is fixed by a holding pawl.

According to the prior art, a cuboid fixing apparatus with a centrally lying groove for fixing the weapon in the weapon barrel is arranged on the object case on objects for use in weapon barrels such as weapons, for example torpedoes, missiles or mines, or stowage containers. Here, the objects for use in weapon barrels are fixed by a holding pawl with only one pawl. For fixing purposes, the pawl lies in the groove in a positively locking manner. In the case of a faulty operation of the holding pawl, it can be possible during weapon barrel loading that the pawl does not come into contact with the groove of the fixing apparatus, or the weapon moves over the holding pawl and the weapon is thus damaged.

DE 10 2009 020 323 A1 has disclosed a weapon recess for receiving a weapon, which weapon recess has a holding pawl. In order that a holding pawl of this type can be used, the fixing apparatus of the weapon has to have a groove, into which the holding pawl engages in a positively locking manner. In order that the pivotably mounted holding pawl rises automatically during the introduction of the weapon, the fixing apparatus has to be beveled in the introduction direction. This leads to it being necessary for the weapon to be designed specifically for the holding apparatus of the weapon barrel.

A series of holding apparatuses are known from the prior art for weapons or objects which have a cuboid fixing apparatus without a groove.

US 5,025,744 has disclosed a rocker-shaped holding apparatus for fixing the fixing apparatus.

US 5,174,236 has disclosed a plate-shaped holding apparatus for fixing the fixing apparatus. Here, the holding apparatus is moved perpendicularly with respect to the translation movement and is thus switched over between the loading state, the closed state and the state for firing the weapon.

US 5,690,044 and US 6,367,307 B1 have disclosed single-piece holding apparatuses for securing a cuboid fixing apparatus. It is necessary in the case of said holding apparatuses, however, to position the object precisely in the weapon barrel during the introduction into the weapon barrel, in order that the holding apparatus can engage exactly over the fixing apparatus.

It is an object of the invention to provide a mount, by which an object with a cuboid fixing apparatus without a groove can be held securely, and it being possible for loading, unloading, running out or ejecting of the object to be carried out securely and reliably, with faulty operations being ruled out as far as possible.

The object is achieved by a mount having the features which are specified in claim 1 and by a weapon barrel having a mount with the features which are specified in claim 10. Advantageous developments arise from the subclaims, the following description and the drawings.

The mount according to the invention for fixing an object in a weapon barrel has a first pawl and a second pawl, it being possible for the first pawl and the second pawl to be moved in each case independently of one another. The first pawl and the second pawl are arranged in such a way that, during fixing of the object, the first pawl and the second pawl are arranged in each case on opposite sides of the fixing apparatus; for example, the first pawl is arranged in front of the cuboid fixing apparatus in the translation direction of the object during the introduction into the weapon barrel, and the second pawl is arranged correspondingly behind the cuboid fixing apparatus. A translation movement of the object in the weapon barrel can thus be prevented. The first pawl and the second pawl are mounted movably. Since the pawls are mounted movably, they can both fix (for storage) and release (for loading and unloading or during running out or ejecting) the object.

The first pawl and the second pawl are preferably mounted such that they can be moved individually.

The pawl is preferably manufactured from high-strength steel, in order that it can absorb the forces which occur.

In one embodiment of the mount, the first pawl and the second pawl are mounted elastically. The elastic mounting of the first pawl and the second pawl can be configured, for example, by virtue of the fact that the pawls are machined in the form of a spring, "in the form of a spring" meaning that the pawl is mounted resiliently. The first pawl and the second pawl are preferably mounted elastically by virtue of the fact that the pawls are mounted rotatably, and that an external force acts elastically in the direction of the object. The external force can be produced, for example, by a spring. Other mechanisms for setting an external force are conceivable, however, which mechanisms permit an elastic movement of the pawl, for example magnetism.

In one embodiment, the first pawl and the second pawl are spaced apart in such a way that they enclose the fixing apparatus of the object in a positively locking manner. In the context of the invention, enclose is understood to mean that the two pawls are situated at least on two opposite sides of the fixing apparatus and therefore fix the latter in a movement direction, preferably in the longitudinal direction of the weapon barrel. This prevents it being possible for the object to move in the weapon barrel. This can be important, in particular, if the position of the weapon barrel changes, for example during surfacing or diving of a submarine or in a swell in the case of a water surface ship.

In one embodiment, the first pawl and the second pawl are arranged in parallel next to one another at a right angle to the movement direction of the object in the weapon barrel. In this case, the first pawl and the second pawl are preferably spaced apart from one another to such an extent that the fixing device of the object fits precisely between the first and the second pawl.

In a further embodiment, the first pawl is beveled on the side which faces away from the second pawl. In the context of the invention, beveled means that the pawl has a shape, with the result that, when the cuboid fixing apparatus is pushed against the beveled side of the pawl, the object is pushed under the pawl and raises the pawl in the process. The bevel advantageously has an angle of between 5° and 70° with respect to the movement direction of the object, particularly preferably an angle of between 10° and 50° , very particularly preferably of between 15° and 40° . The angle is

relative to the longitudinal direction of the weapon barrel which also corresponds to the movement direction of the object. It is possible as a result to introduce an object into the weapon barrel from the side of the first pawl, preferably from the interior of the ship. During the introduction, the cuboid fixing apparatus comes into contact with the beveled elastically mounted first pawl and presses the latter out of the movement track of the object. The object can be introduced further into the weapon barrel, until the fixing apparatus comes into contact with the second pawl.

As an alternative or in addition, it is possible to raise the first pawl during the introduction of the object from the side of the first pawl, preferably from the interior of the ship. The object can also be introduced into the weapon barrel in this case until the fixing apparatus of the object comes into contact with the second pawl. For fixing purposes, the first pawl is lowered again.

In a further embodiment, the second pawl is beveled on the side which faces away from the first pawl. It is possible as a result to introduce an object into the weapon barrel from the side of the second pawl, preferably from the outer side of the ship. During the introduction, the cuboid fixing apparatus comes into contact with the beveled elastically mounted second pawl and presses the latter out of the movement path of the object. The object can be introduced further into the weapon barrel until the fixing apparatus comes into contact with the first pawl.

As an alternative or in addition, it is possible to raise up the second pawl during the introduction of the object from the side of the second pawl, preferably from the outer side of the ship. The object can also be introduced into the weapon barrel in this case until the fixing apparatus of the object comes into contact with the first pawl. For fixing purposes, the second pawl is lowered again.

In a further embodiment, both the first and the second pawl are beveled. It is possible as a result to load an object into the weapon barrel both from the ship interior and from the side of the sea.

In order to run out or eject the object or in order to remove the object from the weapon barrel, the first pawl or the second pawl or both pawls is/are raised up. As a result, the fixing apparatus is no longer fixed and the object can be moved freely.

In a further embodiment, the first pawl and the second pawl are attached in a holding pawl frame. By way of a holding pawl frame, the holding pawls can be replaced if required, if an object with a differently shaped fixing apparatus should be used. Moreover, it is advantageous in the case of the

use of a common holding pawl frame to use mechanical means for raising up the pawls jointly for both pawls and therefore to simplify the overall construction.

In a further embodiment, at least one first buffer is attached to the holding pawl frame. The buffer serves to absorb the kinetic energy of an introduced object. Customary torpedoes with a diameter of 533 mm have a mass of from 1.3 to 1.7 tons. When they are introduced into the weapon barrel, the movement would end abruptly, as soon as the fixing apparatus comes into contact against the second pawl. In order to avoid damage of the object as a result of the impact, a buffer is attached to the holding pawl frame, in order to absorb the kinetic energy of the object and to brake the latter gently.

The buffer is preferably configured in the form of an elastic plastic mass which is adhesively bonded between two metal plates. The buffer acts in such a way that a pulse along the movement direction of the object is absorbed by the buffer. The buffer preferably has guide rods which permit the possible movement of the buffer and therefore also of the pawl only in the direction of the guide rods. The guide rods are preferably parallel to the longitudinal direction of the weapon barrel. The guide rods are preferably configured as pins.

In one preferred embodiment, the buffer is arranged between the holding pawl frame and the mounting. The mounting is connected rigidly to the weapon barrel and therefore transmits the pulse of the introduced object, absorbed by the holding pawl frame, to the weapon barrel.

In a further embodiment, at least one first buffer and at least one second buffer are attached to the holding pawl frame. As a result, the buffering is made possible during the loading both from the ship interior and from the outer side of the ship.

In a further embodiment, the holding pawl frame has a torsional spring which acts on the first pawl and the second pawl in the direction of the object. The torsional spring generates a force F_D , with which the first pawl and the second pawl act on the object. An advantage of a torsional spring is the satisfactory integration into a flat design of the mount, in particular the simple integration into the holding pawl frame and therefore a satisfactory integration into the weapon barrel. The torsional spring is preferably encapsulated in a watertight manner.

In a further embodiment, the mount has a wedge. The wedge can be moved relative to the first pawl and the second pawl. By way of the wedge, the first pawl and the second pawl can be moved in the direction away from the object. The pawls have to be removed from the object, in particular for running out or ejecting the object, in order that said object can move freely. This can be ensured with the aid of the wedge in a simple way. The wedge is preferably actuated hydraulically or manually.

Furthermore, the invention relates to a weapon barrel having a mount according to the invention.

In one preferred embodiment of the invention of the weapon barrel, the object is a torpedo, and the fixing apparatus is a holding nipple, as is customary for torpedoes. The first pawl is arranged behind the holding nipple in the running direction of the torpedo, and the second pawl is arranged in front of the holding nipple in the running direction of the torpedo. The first pawl and the second pawl enclose the holding nipple in a positively locking manner.

In a further embodiment of the invention, the position of the pawls is detected using the position of the drive mechanism which is coupled to the wedge. As an alternative or in addition, the position of the pawls can also be detected using sensors in the frame.

In the following text, the mount according to the invention is explained in greater detail using one exemplary embodiment which is shown in the drawings, in which:

figure 1 shows a weapon barrel with a mount and exemplary torpedo loading,

figure 2 shows a detailed view X of the mount,

figure 3 shows a view Y of the mount with a fixed fixing apparatus,

figure 4 shows a cross section A-A (axial) through the weapon center in the state of weapon barrel loading,

- figure 5 shows a cross section A-A (axial) through the weapon center in the state of fixing of the fixing apparatus,
- figure 6 shows a cross section A-A (axial) through the weapon center in the state of running out/ejecting/unloading,
- figure 7 shows a cross section B-B (axial) through the point of the pawl mountings with an indicated torsional spring,
- figure 8 shows a cross section C-C (radial) through the pawls, and
- figure 9 shows a cross section D-D (axial) through the profiled wedge.

Figure 1 shows a weapon barrel having a weapon barrel casing 2. An object 1, a torpedo here by way of example, is loaded in the weapon barrel. The object 1 is held in position by means of a mount 13.

The region X of figure 1 is shown on an enlarged scale in figure 2. Welded holding pieces 7 are welded on the weapon barrel casing 2. The mount 13 has mountings 8. The mountings 8 are screwed to the welded holding pieces 7.

Figure 3 shows the mount 13 according to figure 2 in plan view. The mount 13 has a holding pawl frame 6, in which a first pawl 4 and a second pawl 5 are arranged. A fixing apparatus 3 of an object 1 can be held between the first pawl 4 and the second pawl 5. The holding pawl frame 6 is connected to the mountings 8 via pins 9 and buffers 10. The buffers 10 serve to absorb the impact which is produced when the fixing apparatus 3 of an object 1 comes into contact against the first pawl 4 or the second pawl 5 during loading.

The first pawl 4 and the second pawl 5 are mounted such that they can be pivoted via pins 14. In order to hold the first pawl 4 and the second pawl 5 elastically in position, the mount 13 has a torsional spring 11 (shown in figure 8). The torsional spring 11 is plugged in clamping pieces 15 on both sides. The force F_D , with which the first pawl 4 and the second pawl 5 are pressed downward,

is achieved by way of rotation of clamping pieces 15 with subsequent locking by means of lock nuts 16.

In order to raise the first pawl 4 and the second pawl 5 counter to the pressure of the torsional spring 11, the mount 13 has a wedge 12, furthermore.

The method of operation of the mount 13 according to the invention is to be shown using the introduction of an object 1 in figure 4, the fixing of the object 1 in figure 5, and the running out or ejecting of the object in figure 6. Here, the velocity V indicates the movement of the object.

During the introduction of an object 1 with a fixing apparatus 3 into a weapon barrel with a mount 13, the fixing apparatus 3 first of all comes into contact with the first pawl 4. The latter is beveled, as shown in figure 4. As a result, the fixing apparatus 3 raises the first pawl 4 counter to the force F_D which is generated by the torsional spring 11. The object 1 can be introduced further until the fixing apparatus 3 comes into contact with the second pawl 5. As a result of the force F_D , the first pawl 4 returns into the original position. The force of the impact of the fixing apparatus 3 against the second pawl 5 is absorbed by the buffers 10, in order to prevent damage on the mount 13 or the object 1. The situation which is shown in figure 5 is produced. The securing of the object 1 in a correct position can be tested by way of the object 1 being pulled back after the introduction. In order to remove the object 1 from the weapon barrel, either in order to receive it into the interior of the boat, in order, for example, for it to be possible to introduce a different object 1, or in order to allow the object to run out or to eject it, the first pawl 4 and the second pawl 5 are raised by the wedge 12, as shown in figure 6. The fixing apparatus 3 of the object 1 can be moved freely, and the object 1 can either be removed into the interior of the boat, or the object 1 can run out or be ejected.

Figure 7 shows a cross section B-B from figure 3 through the point of the pawl mountings with a torsional spring 11. Pins 14, preferably as square pins, are attached to the holding pawl frame 6, and clamping pieces 15 are attached via lock nuts 16, by way of which clamping pieces 15 the torsional spring 11 is stressed. The fixed counterbearing of the torsional spring 11 lies in the center of the holding pawl frame 6. Since the weapon barrel is flooded for running out or ejecting the object, the mount 13 is exposed at least temporarily to water, in particular salty seawater. For this reason, the apparatus has sealing systems 17, in order to prevent corrosion of the torsional spring 11 and thus a reduction of the force F_D .

Figure 8 shows the cross section C-C from figure 3 through the pawls 4, 5. The pawl 4, 5 is arranged in the holding pawl frame 6 and is pressed downward with the force F_D by means of the torsional spring 11 and is mounted rotatably on the pin 14. In order for it to be possible to raise the pawl 4, 5, the wedge 12 is arranged under the pawl 4, 5. In order to raise the pawl 4, 5, a force has to be exerted via the wedge 12 on the pawl 4, 5, which force compensates for the torque M_D of the torsional spring 11. If the wedge 12 is pushed back into its original position, the forces F_D press the pawl 4, 5 back into the lowered position. The wedge 12 is profiled in such a way that there is sufficient offsetting in the profile surface in the case of impacts in the longitudinal direction, such that the pawl 4, 5 is not raised unintentionally. The wedge can be actuated both hydraulically or pneumatically and manually.

The wedge 12 is shown in a detailed manner in figure 9 as a cross section D-D from figure 3. In the position of the wedge 12 as shown, the first pawl 4 and the second pawl 5 are situated in the lowered position. If the wedge 12 is displaced to the left, the first pawl 4 and the second pawl 5 are raised. As a result, the fixing apparatus 3 is no longer fixed, and the object 1 can run out, be ejected or be removed.

List of Designations:

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| 1 | Object |
| 2 | Weapon barrel casing |
| 3 | Fixing apparatus |
| 4 | First pawl |
| 5 | Second pawl |
| 6 | Holding pawl frame |
| 7 | Welded holding piece |
| 8 | Mounting |
| 9 | Pin |
| 10 | Buffer |
| 11 | Torsional spring |
| 12 | Wedge |
| 13 | Mount |
| 14 | Pin |
| 15 | Clamping piece |
| 16 | Lock nut |
| 17 | Sealing system |
| F_D | Spring force pressure force |
| M_D | Torque |
| V | Velocity |

Patent Claims

1. A mount for fixing an object (1) with a fixing apparatus (3) in a weapon barrel, the mount having a first pawl (4) and a second pawl (5), the first pawl (4) and the second pawl (5) being arranged in such a way that, during fixing of the object, the first pawl (4) and the second pawl (5) are arranged in each case on opposite sides of the fixing apparatus, characterized in that the first pawl (4) and the second pawl (5) can be moved in each case independently of one another, and the first pawl (4) and the second pawl (5) being mounted movably.
2. The mount as claimed in claim 1, characterized in that the first pawl (4) and the second pawl (5) are spaced apart in such a way that they enclose the fixing apparatus (3) of the object (1) in a positively locking manner.
3. The mount as claimed in either of the preceding claims, characterized in that the first pawl (4) and the second pawl (5) are mounted elastically.
4. The mount as claimed in one of the preceding claims, characterized in that the first pawl (4) is beveled on the side which faces away from the second pawl (5).
5. The mount as claimed in one of the preceding claims, characterized in that the second pawl (5) is beveled on the side which faces away from the first pawl (4).
6. The mount as claimed in one of the preceding claims, characterized in that the first pawl (4) and the second pawl (5) are attached in a holding pawl frame (6).
7. The mount as claimed in claim 6, characterized in that at least one first buffer (10) is attached on the holding pawl frame (6).
8. The mount as claimed in either of claims 6 and 7, characterized in that the holding pawl frame (6) has a torsional spring (11) which acts on the first pawl (4) and the second pawl (5) in the direction of the object (1), and the torsional spring (11) generating a force F_D of the first pawl (4) and the second pawl (5) on the object (1).
9. The mount as claimed in claim 8, characterized in that the torsional spring (11) is encapsulated in a watertight manner.

10. The mount as claimed in either of claims 6 and 7, characterized in that the mount has a wedge (12), wherein the wedge (12) is movable relative to the first pawl (4) and the second pawl (5), and wherein the first pawl (4) and the second pawl (5) is movable in the direction away from the object (1) by the wedge (12).
11. A weapon barrel having a mount as claimed in one of the preceding claims.
12. The weapon barrel as claimed in claim 11, characterized in that the object (1) is a torpedo, in that the fixing apparatus (3) is a holding nipple, and in that the first pawl (4) is arranged behind the holding nipple in the running direction of the torpedo, and in that the second pawl (5) is arranged in front of the holding nipple in the running direction of the torpedo, and in that the first pawl (4) and the second pawl (5) enclose the holding nipple in a positively locking manner.