Adapter for a Gun

The invention relates to an adapter for attaching a device, in particular a Harris bipod, to a projective rail or father rail, in particular a Weaver or Picatinny rail, of a gun, a crossbow or suchlike, whereby the top of the device has surfaces and means, in particular a tie rod for tightening the device on the father rail.

A similar adapter for attaching a bipod for a gun is shown in US 2005/0188588 A1 and in US 2005/088597 A1.

Below, we assume the normal position of the gun and the attached device in the form of a bipod, i.e. with a horizontal bore axis and a horizontal transverse axis. In this connection, "top" also means "facing the gun" and "bottom" also means "facing away from the gun". But other devices with similar mechanics such as this bipod are also possible and these devices do not need to be attached to the bottom of the gun.

The Harris bipod has long been known for the benchrest guns, military sharpshooter guns and any guns requiring a secure, calm support for releasing a precision shot. A number of marksmen have such a Harris bipod and almost every gun can be equipped with one.

This Harris bipod has two long, padded support surfaces that are slightly tilted towards the horizontal mid-line. There are two mainly vertical, powerful fingers, which lie adjacent to each other in the transverse direction and each of the top ends of which have a pin, arranged between the support surfaces. The fingers can be moved upwards using a knurled head screw, where they can be moved apart against the force of a spring, or downwards, where the fingers then run into a slotted piece, which pushes them apart and thus the pins as well and makes it impossible to separate them.

A counter surface is located on the front shaft of the gun on both sides and symmetrical to its longitudinal axis. A block, which has a transverse bore hole, sits between the counter surfaces. The block can, for example, sit on a pusher, which is inserted into a central, horizontal, embedded dove-tail longitudinal rail or mother rail or can e.g. be screwed directly onto the shaft.

When attaching the bipod, its fingers are pushed upwards and apart against the force of the spring until the pins are located on both sides of the transverse bore hole of the block. The fingers are then released so that the pins engage with the transverse bore hole. Then the knurled head screw is pulled, whereby the fingers are moved downwards with the help of a lever, in turn pulling the block and counter surfaces downwards until contact surfaces and counter surfaces reach full bearing.

The special advantage of this known bipod is that it can be removed when not in use and only needs to be attached when needed

so that e.g. a marksman can have several guns, which are suitable for the attachment of a bipod, but only one single bipod is needed. However, one disadvantage is that a protruding pin must be securely attached to the pin on the gun. For reasons of stability, it is not advisable to dismantle the block, since the thread(s) for its mounting could otherwise be rejected; in any case, a tool and a single skill are required for this. Thus, as a general rule, the protruding block remains on the gun, where it is obstructive, until the bipod is attached.

The gunsmith should perform the retooling of a gun for the attachment of a bipod. The clean attachment of the clean thread requires technical expertise that a hobbyist does not have.

The bipod is normally attached as far forward on the gun as possible. But sometimes the territory, in which the a sharp shooter wants to position himself, can make another attachment point desirable or it may be desired that a laser range finder be inserted into the mother rail in front of the bipod. But this type of arrangement is then rendered impossible for constructional reasons.

The attachment of add-on devices (sights, laser range finders, night target device, spotlight, additional hand grip, etc.) has become increasingly important of late, so that special, projecting, relatively wide rails or father rails (so-called Picatinny or Weaver rails) are attached to the front side of all types of weapons and even on the bottom side of the shaft or hand guard. New guns can be provided with such rails, but existing guns can also be equipped with father rails. Since

these rails are relatively wide and somewhat long, they do not impede support on the body and do not get stuck in shrubbery, etc.

Devices that are provided with a mother rail or a mother profile can be slid on easily. If the jaws of the mother profile can be moved, the devices are also fit and tightened from above or from below. The case of the latter, the devices can engage in a transverse groove of the father rail, whereby slipping along the father rail is rendered impossible.

At any time, a block can be placed on the bottom side of this type of rail that is attached below the barrel, as is provided for the attachment of the aforementioned bipod. The aforementioned disadvantages, which have such a prominent block, must be taken into consideration. Moreover, no other device can be pushed onto a rail with this type of block on the front side.

The object of the invention is to counteract the aforementioned disadvantages in a gun or suchlike with a father rail attached, in particular, on the bottom.

This object is achieved in accordance with the invention in a known adapter such that it
- comprises a coupling female fitting on the father rail, which is capable of reaching behind the flanks of the father rail and which has counter surfaces on the bottom side for the support of the support surfaces,
- has a device for immobilizing the coupling female on the father rail, and

- comprises a block projecting downwards from the coupling female, which is arranged between the counter surfaces in order to hook in a tie rod.

In accordance with the invention, the block is not attached to the father rail, but rather to a coupling female. The coupling female can not only be removed after the dismantling of the device for its immobilization of the father rail, but can also be moved as desired if another attachment point is desired or unavoidable.

One could potentially think that the attached coupling female would be rather cumbersome with the block, when the device or bipod is removed (when the bipod is mentioned below, in addition to the Harris bipod, any device with the same attachment arrangement is meant). However, the bipod remains securely attached to the block; at least, the fingers are not moved or pressed apart when the bipod knurled head screw needs to be detached, so that the bipod always remains on the block. The situation that the separate block protrudes from the coupling female, while the coupling female is attached to the gun, does not occur with proper use, since the coupling female is always also removed when the bipod is removed from the gun. The bothersome, protruding block, which represents the biggest disadvantage of the Harris bipod, does not appear according to the invention.

If the bipod is used in a weapon, which has no Weaver or Picatinny rail or suchlike (father rail), the free ends of the fingers of the bipod are pushed together when the knurled head screw is removed and the coupling female with block is removed. But this only takes place after the entire arrangement, made up of the bipod and the coupling female, is removed from the father rail. A shooter, who has obtained a gun

with a father rail or who has attached a father rail to a gun, can not only continue to use the Harris bipod, but can also continue to use it on his other guns that do not have a father rail, but rather only a protruding block.

In the case of a particularly narrow front shaft, it is possible to insert an intermediate piece between the coupling female and the contact surfaces of the bipod. However, it is preferred that the bottom side of the coupling female has the size and shape of a section, preferably the front end, of the front shaft or hand guard of a gun or suchlike. The counter surfaces are thus designed directly on the bottom side of the mother piece. Since a Weaver or Picatinny rail is relatively wide, the coupling female must not be overly broadened. If the coupling female is made of metal, e.g. an aluminum alloy, or is made of hard plastic, it is also possible to design the counter surfaces to be narrower than the contact surfaces of the bipod. The thus-achieved, high surface pressure is harmless for a coupling female made of metal or a hard plastic. The length of the coupling female, as seen from the longitudinal direction of the gun, should preferably at least correspond with that of the contact surfaces.

It would be possible introduce transverse grooves or slits into the counter surfaces for weight reduction. However, according to the invention, each of the counter surfaces is preferably designed as one piece. Since the contact surfaces are provided with an elastomer overlay, this would be pressed onto the edges of the slit and damaged over time during shooting. However, it was discovered that the continuous longitudinal edges of the coupling female, if it is overlapped laterally from the contact surfaces,

does not damage the elastomer overlay of the bipod due to its low stress.

If the coupling female is designed as one piece, then it is, as in a conventional telescopic site, is pushed onto the rail (usually) from the front. If there is already a spotlight or a laser range finder, then it must be removed first. The bipod with adapter is then pushed on and then the spotlight or laser range finder is attached. This is somewhat cumbersome. In order to avoid these circumstances, it is suggested according to another preferred version of the invention that the coupling female has two parts, which can be pivoted around a longitudinal, central swivel axis so that they firmly encompass the side flanks of the father rail when it is pivoted up and thus form the device for immobilizing the adapter on the father rail. Thus, at first, the one-piece coupling female is changed to a two-piece, which represents a certain effort. However, it has been determined that no only the adapter and thus the bipod can be installed and removed at any position on the father rail diagonal to it, but rather that the immobilization device is replaced by the two parts. The immobilization device is served by the bipod. When the knurled head screw of the bipod is tightened after being installed, each of the contact surfaces pushes the corresponding counter surface upwards, where it reaches around the flank of the father rail and securely clamps on it against the other part. When removed, both parts pivot apart when the knurled screw of the bipod is detached again. The adapter thereby remains on the bipod as long as both free ends of the fingers are pushed together when detached.

When installing and removing the bipod, the same and only the same handgrips are required, as without the adapter, but no permanently installed block is required, as would be the case without an adapter. Rather, the bipod with its adapter can be installed on each suitable father rail and at any position where there is space. After the adapter is removed, the weapon is not changed, i.e. no protruding, obstructive block exists, as was previously the case without an adapter.

In accordance with the invention, another embodiment exists in that a protrusion or a ridge is designed to engage with a transverse groove on the father rail at least on the top side of one of the pivotable parts. This embodiment can preferably only be used if the rail has transverse grooves. For example, when the weapon is retracted, i.e. when forces are attached to the bore axis on the adapter, the surfaces of the adapter, which encompass the father rail laterally and clamp the adapter there, are not strained. Rather, the load is transferred directly to the father rail by the ridge.

It would be possible to design the block as one piece with the coupling female, even if it is one piece. In accordance with another embodiment of the invention, it is particularly advantageous that the block is made of metal, preferably steel, and protrudes from the bottom side of the adapter. The coupling female or its parts can be made of light metal alloy or plastic. As long as the anchoring of the block is reliably released in this light metal or plastic, a particularly stable but (due to the option of die casting or injection molding) particularly cost-effective solution is obtained. It is thereby unimportant how high the surface pressures become when hooking the pins of the fingers of the bipod, because if

a suitable metal is selected for the block, these surface pressures still lie far below the load limit of the block material.

For the two-piece coupling female, another embodiment is preferably suggested, which consists in that the block has a longitudinal bushing on its top side, which is penetrated by the swivel axis. The swivel axis, which can be produced cost-effectively as a simple swivel plate made of any metal, is largely supported on both parts of the coupling female. The swivel axis penetrates the bushing so that a secure support is found. Moreover, it should be ensured that the block can take up a position for each of the two coupling females, which corresponds with half of the angle that both coupling females can take up with respect with each other.

In order to simplify the removal of the bipod with adapter, it is preferred that both parts of the adapter are pushed by a spring into a position, in which they release the father rail. The installation of the adapter is also simplified, as the spring ensures that both parts of the coupling female are spread apart if they are not pushed together by the contact surfaces. Thus, it is also possible to place it overhead, i.e. it can be placed on the upwards pointing gun from above.

It is thereby particularly advantageous that the spring is designed as a wire spring, which is wound around the swivel axis and presses from above with each of its legs on one of the parts of the adapter. The spring is thus a simple, particularly cost-effective wire bending part.

In an advantageous embodiment, the adapter is made up of only five parts, of which only the block

is somewhat complicated to produce, e.g. as a precision cast part. The other parts are simple die casting or bending parts for the parts of the coupling female, a simple automated swivel plate for the swivel axis and a bending part for the spring. A spring ring may be required to hold the swivel axis. The most expensive part by far, namely, the block, was also required up to now. This minimal additional effort not only enables the attachment of the unchanged bipod to a father rail, but also the attachment at any position without leaving a mark after removal.

It is also preferred that the block on the longitudinal bushing has an upwards pointing nose, which is designed to engage with a transverse groove on the father rail. When the adapter and bipod are placed on the father rail, the nose engages with a transverse groove on the father rail and sinks slightly when the knurled head screw is pulled, but not so far that it is removed from the transverse groove. Thus, in the same manner, the nose ensures the fit of both parts of the mother rail in the direction of fire, as the aforementioned protrusion or ridge also did, which can thus be dispensed with in the case of the nose.

The object of the invention is explained in greater detail using an exemplary embodiment, which is shown in the drawing, but which is not intended to restrict the invention in any way. The following is shown in the drawing:

Fig. 1 shows the side view of a hand guard of a rapid fire gun, with the adapter installed, whereby the bipod is left off for a better overview,

Fig. 2 shows the longitudinal cut (cut A-A in Fig. 3) through the illustration in Fig. 1,

Fig. 3 shows the front view of the hand guard in Fig. 1,

Fig. 4 shows the cross-section (cut B-B in Fig. 2) through the hand guard and adapter, whereby the bipod is indicated, and

Fig. 5 shows a 3D top view of the removed adapter.

Figures 1 through 4 show a one-piece hand guard 5 made of aluminum, which is pushed from the front over the barrel and the gas intake of a rapid fire weapon. A front-site support does not sit on the barrel, as is customary; instead, the site is located on the hand guard 5, in particular on the Picatinny rail 7. Four Picatinny rails 7 are arranged on the hand guard 5, namely an upper, a lower and two lateral rails. An arrow C in Fig. 1 and 2 indicates the forward direction, i.e. the direction of fire.

An adapter, which is always labeled with the number 1, is clamped with the Harris bipod on the lower Picatinny rail 7. This Harris bipod is generally known and is thus not illustrated here for clarity; only the upper section of part 4, which has the contact surfaces 11, is shown in Fig. 4 in cross-section.

The adapter 1 is made up of two pivot parts 2, 3, which can pivot around an axis 13. The pivot part 2 has three laterally protruding hinged appendages 15, into which three lateral hinged appendages 17 of the pivot part 3 engage. A recess 19 is left between the middle hinged appendages 15 of the pivot part 2, into which a bushing 21 engages, which is designed on the top of the block 23 as one piece.

A continuous bore hole 25, in which the axis 13 sits with slight play, runs through the hinged appendages 15, 17 and through the bushing 25.

The part of the bore hole 25, which runs through the bushing 21, can be somewhat smaller than the bore hole 25 through the appendages 15, 17 so that the bushing 21 and thus the one-piece, interconnected block 23 with press fit sit on the axis 13. An axis head may thus be unnecessary on one end and a spring washer may be unnecessary on the other end of the axis 13.

The block 23 protrudes downwards and outwards between the two pivot parts 2, 3, is approx. square in cross-section and has a cross-hole 27. It is thus identical to the known attachment block for Harris bipods, but is different in that it has bushing 21 in place of the known assembly device on the top side. This bushing 21, together with the other parts of the adapter 1, guarantees that the cross-hole 27 of the block 23 is always positioned diagonal to the direction of fire.

A nose 31, which is located on the top side of the block 23 and thus bushing 21, engages with a transverse groove 33 on the Picatinny rail 7 (generally referred to as "father rail" in the above description). The nose 31 prevents the adapter 1 from detaching to the front or back in relation to the father rail 7.

Figure 5 shows a version, in which a recess is left between two hinged appendages 17 of the pivot part 3 and a helical spring 29 is pushed onto the axis 13. Both ends of the spring 29

are designed as legs protruding radially in opposite directions. The legs lie in corresponding indentations of the pivot parts 2, 3, so that the pivot parts 2, 3 are pivoted apart in a direction, pointing away from the rail 7.

When installing the Harris bipod, the knurled head screw is first loosened and the pins are hung into the cross-hole 27 on the top end of the fingers of the bipod (not shown in the drawing) from both sides. The pivot parts 2, 3 are then pivoted apart as long as this does not still occur through the helical spring 29 displayed and explained in the embodiment in Fig. 5. The adapter 1 with bipod is then attached from below on the rail 7, whereby the upper, lateral flanks of the adapter 1 or the pivot parts 2, 3 can be pushed upwards from below over the side flanks of the rail 7. The knurled head screw of the Harris bipod is then pulled, whereby the block 23 is pulled down slightly between the upper parts 4 of the Harris rail so that each of the contact surfaces 11 from below sit on a counter surface 35 of the pivot part 2, 3. The pivot parts 2, 3 are pivoted upwards with the edge such that each of the lateral edges of the pivot part 2, 3 overlap and attached securely to this lateral edge. Elastomer overlays on the contact surfaces 11 can further improve the permanent connection, since they counterbalance small alignment errors.

When the Harris bipod is removed, its knurled head screw is loosened. The two pivot parts 2, 3 then pivot apart due to the effect of gravitational forces or are pushed apart by the helical spring 29 (Fig. 5) so that the rail, father rail or Picatinny rail 7 is released and the bipod can be easily removed

towards the bottom. The pins thereby remain in contact with the cross-hole 27 so that the bipod and adapter 1 always remain together.

The removal and installation of the bipod with adapter 1 is thus much easier, as is the case without adapter 1.

When the marksman wants to remove adapter 1, e.g. when the bipod needs to be used on another gun with a conventional mount and without a father rail, he just needs to push the bottom ends of the fingers together when the bipod is detached. The adapter 1 can then be lifted up and out. This is the same activity as when the bipod is detached from a gun with a conventional mount.

The adapter 1 thus does not limit the uses of the bipod in any way, but rather expands the options for use. A gun with a father rail requiring the adapter 1 also remains undamaged, even if the bipod is attached, while in the case of a conventional mount, a block needs to be attached, which affects the appearance of the gun and also protrudes from the gun. Its options for use without a bipod are thus considerably affected.

The exemplary embodiment shows the hand guard 5 without a father rail and the two pivot parts 2, 3 made of aluminum alloy, while the axis 13 is made of steel. The block 23 with bushing 21 can be made of aluminum or steel. But all other types of materials are also possible, as long as they meet demands, especially like hard plastic for the pivot parts 2, 3.

Patent Claims

1. Adapter (1) for attaching a device, in particular a Harris bipod, to a projective rail or father rail (7), in particular a Weaver or Picatinny rail, of a gun, a crossbow or suchlike,
characterized in that the device
- comprises a tie rod for tightening the device on the adapter (1) and contact surfaces (11) on its upper surface,
- comprises a coupling female (2, 3) fitting on the father rail (7), which is capable of reaching behind the flanks of the father rail (7),
- comprises counter surfaces (35) on the lower side of the adapter for contact with the contact surfaces (11),
- has a device for immobilizing the coupling female (2, 3) on the father rail (7), and
- comprises a block (23) projecting downwards from the coupling female (2, 3), which is arranged between the counter surfaces (35) in order to hook in a tie rod.

2. Adapter (1) in accordance with claim 1, characterized in that the bottom side of the coupling female (2, 3) has the size and shape of a section, preferably the front end, of the front shaft or hand guard of a gun or suchlike.

3. Adapter (1) in accordance with one of claims 1 or 2, characterized in that each of the counter surfaces (35) is designed as one piece.

4. Adapter (1) in accordance with one of claims 1, characterized in that the coupling female has two parts (2, 3), which can be pivoted around a longitudinal, central swivel axis (13) so that they firmly encompass the side flanks of the father rail when it is pivoted up and thus form the device for immobilizing the adapter (1) on the father rail (7).

5. Adapter (1) in accordance with claim 4, characterized in that a protrusion or a ridge is designed to engage with a transverse groove (33) on the father rail (7) at least on the top side of one of the pivotable parts (2, 3).

6. Adapter (1) in accordance with one of claims 1 through 5, characterized in that the block (23) is made of metal, preferably of steel, and protrudes from the bottom side of the adapter (1).

7. Adapter (1) in accordance with one of claims 4 through 6, characterized in that the block (23) has a longitudinal bushing (21) on its top side, which is penetrated by the swivel axis (13).

8. Adapter (1) in accordance with one of claims 4 through 7, characterized in that both parts (2, 3) of the adapter (1) can be pushed by a spring (29) into a position, in which they release the father rail (7).

9. Adapter (1) in accordance with claim 8, characterized in that the spring is designed as a wire spring (29), which is wound around the swivel axis (13) and presses from above with each of its legs on one of the parts (2, 3) of the adapter (1).

10. Adapter (1) in accordance with one of claims 7 through 9, characterized in that the block (23) on the longitudinal bushing (21) has an upwards pointing nose (31), which is designed to engage with a transverse groove (33) of the father rail (7).