

SHELL GRIPPING DEVICE AND CORRESPONDING STRETCHER

5 The technical field of the invention is that of the devices for gripping large-caliber shells.

As the large-caliber shells are heavy to convey by gunners, it is known to use shell gripping devices which, once coupled with a lifting means, alleviate the burden of the gunners during these handling operations.

10 The gripping devices known often use complex actuators such as cylinders or engines intended, on one hand, to grip the shell and, on the other hand, to release it. Due to their complexity, these actuators are expensive and reduce the reliability of the device due to their own risks of
15 failure.

In order to simplify the operation, patent US1039727 teaches the use of a gripping means comprising a pair of jaws intended to be arranged on either side of the longitudinal axis of the shell to be gripped. The jaws pivot in an open
20 position when they abut against the shell, and then come back in a closed position under the action of a spring, once the diameter of the shell is reached (jaws below the axis of the shell), thereby blocking the exit of the shell.

The release of the shell is performed by pivoting the
25 jaws to the open position by an additional actuator.

Despite its simplification to grip the shell, the device according to patent US1039727 still requires an actuator for releasing the shell.

The invention suggests a gripping device even more
30 simplified, in which no powered actuator is required. Furthermore, the invention allows to grip the shell in a safer manner.

Thus, the invention relates to a shell gripping device, comprising at least one pair of jaws for holding a

shell, each jaw pivoting between an open position and a closed position around a pivot axis parallel to the longitudinal axis of the shell, the pivot axis of each jaw being located between a lower end and an upper end of the jaw, the upper end of each jaw allowing to close the jaw by abutting this upper end against a shell to be gripped, the upper end of each jaw being provided with a notch for interfering with a lug of a cam to hold the jaws in the closed position, the cam being integral with a pivoting blade the pivoting of which allows to pivot the cam and to thus disengage the lug from the rotating trajectory of the notch of the jaw, thereby releasing the opening of the jaw, the gripping device being characterized in that the cam has a stop for limiting the opening stroke of the jaw.

Advantageously, the gripping device has two pairs of jaws and two pairs of cams, each pair of jaws and of cams being arranged to be able to be positioned at a vicinity of a different end of a shell to be gripped.

Advantageously, each cam is made integral with a blade by a shaft.

Advantageously, the gripping device has a fastening interface for making the device integral with a lifting means.

Advantageously, the gripping device has an elastic means for biasing the cam and the blade back in a position tending to block the opening of the jaws.

The gripping device could be provided with at least one block in its rear part which is intended to abut against a rear face of the base of the shell in order to position the latter longitudinally with respect to the device.

The invention also relates to a stretcher intended to accommodate a shell in a substantially horizontal position, the stretcher being characterized in that it comprises an abutment area for interfering with a blade of a gripping device as mentioned above.

The invention will be better understood upon reading the following description, made with reference to the appended drawings, in which:

5 FIG.1 shows a three-quarter perspective view of a device according to the invention, positioned above a shell.

 FIG.2 shows a cross-sectional view, with planes parallel according to the cutting planes P and P' and according to the directions A-A, of the device according to
10 the invention in an open position, above a shell.

 FIG.3 shows a cross-sectional view, with planes parallel according to the cutting planes P and P' and the directions A-A, of the device according to the invention in a closed position, positioned on a shell.

15 FIG.4 shows a cross-sectional view, with planes parallel according to the cutting planes P and P' and the directions A-A, of the device disengaging from a shell.

 FIG.5 shows a three-quarter perspective view of a device according to the invention, of the device releasing a
20 shell above a stretcher.

 According to FIG.1, a gripping device 1 according to the invention is arranged above a shell 100 in order to grip this shell 100. To this end, the longitudinal axis 2 of the
25 device 1 is placed substantially parallel to the longitudinal axis 101 of the shell 100. The device 1 comprises a frame 3 provided with fastening interfaces 4, in this particular case with rings 4, for making the device 1 integral with a lifting means not shown, such as a lifting arm or a rail hoist, for
30 example.

 The device 1 is provided with two pairs of jaws 51 and 52 located at each end of the device 1. A first pair 51 located to the front AV of the device is for gripping the shell 100 at its warhead part. A second pair 52 is for

gripping the shell 100 at its base 102. Each jaw 5 of each pair can rotate around a pivot axis 6 parallel to the longitudinal axis 2 of the device 1.

Each jaw 5 of each pair 51 and 52 and their relative axes 6 are intended to be placed on either side of the longitudinal axis 101 of the projectile 100 to grip the latter.

As visible in FIG.2, the pivot axis 6 of each jaw 5 is located between an upper end 5a and a lower end 5b of the jaw 5.

This figure is a cross-sectional view along the parallel planes P and P' shown in FIG.1. The right part of the figure shows a jaw 5 of the pair 52 located at the rear AR of the device. The left part of the figure shows a jaw 5 of the pair 51 located at the front AV of the device.

Each jaw 5 is configured to tend to open by pivoting the upper part 5a of the jaw 5 towards the interior of the device 1. The pivot movement will be obtained with conventional means such as an elastic means tending to rotate the jaw 5 as desired. The center of gravity of the jaw 5 could also be positioned with respect to the position of the pivot axis 6 such that the jaw naturally pivots by gravity in the desired direction.

In order to limit this opening movement, the upper part 5a of the jaw 5 is provided with a notch 7 interfering with a stop 8 of a cam 9 which is pivotable around the axis of a shaft 14 arranged parallel to the pivot axis 6 of the jaws 5. This stop 8 thus allows to control the open position of the jaw 5, thereby making the operation of the device more reliable by avoiding any accidental interference of the jaw with the stretcher or the shell to be gripped.

In this manner, the device 1 and its pairs of jaws 51 and 52 are held in an open position.

In order to grip a shell (see FIG.3), the device 1 has to be lowered on a shell 100 until the upper parts 5a of each jaw 5 come in contact with the shell. In order to better ensure this contact, the upper inner part of the jaw 5 could have a bulge 18 visible in FIG.2.

It can be noted, according to FIGS.1, 2 and 3, that the device has blocks 15 in its rear part AR which allow to position the shell longitudinally with respect to the device 1 by abutting the rear face of the base of the shell 100 against these blocks 15. Here, the device comprises two blocks 15 (FIG.2) which are arranged symmetrically with respect to a median plane located at equal distance from the jaws 5 of each pair.

By continuing to lower the device 1 towards the shell 100, the jaws 5 abut against the shell by their upper end 5a and pivot around the pivot axes 6 and are gradually closed.

Once in the closed position, the jaws 5 hold tightly the shell 100 and are blocked in this position by the interference of the notch 7 of each jaw 5 with a lug 11 of the cam 9 which is pivoted downwardly (FIG.3).

Each of the cams 9 located on the same side of the device 1 is integral with a pivoting blade 13 by the shaft 14 (shaft visible in FIG.1). Each blade 13, protruding outside the device 1, is provided with an elastic means 12, in this particular case a coil spring 12, which causes the cams 9 to rotate such that they oppose the lug 11 to the opening trajectory of the notch 7 of the upper part 5a of each jaw 5.

As visible in FIG.4, the shell 100 is thus securely blocked between the jaws 5 which correspond in shape with the section of the shell which is held tightly. To this end, each pair of jaws 51 and 52 will have a spacing adapted to the perimeter profile and to the diameter of the area of the shell which will be gripped.

According to FIG.5, the shell 100 thus gripped by the device 1 is conveyed vertically with respect to a stretcher 200 intended to accommodate the shell. The longitudinal axis of the device 1 and that of the shell 100 are placed parallel to the longitudinal axis of the stretcher 200. The stretcher 200 is provided with a post 201 extending substantially vertically and laterally with respect to a shell depositing area 202.

At the top of the post 201 is located an abutment area 203 for forming a surface interfering with the blade 13 of the device 1. Thus, by lowering the device 1, each of the blades 13 located on either side of the device 1 will abut against one of the abutment areas 203 and be raised as the device 1 is lowered. By doing so, the raising of the blades 13 causes the pivoting of the cams 9 which will remove their lug 11 which were abutted against the notches 7 of each jaw 5. The weight of the shell 100 which applies on the lower part 5b of the jaws will cause their opening. The shell 100 thus released will fall in the depositing area 202 of the shell stretcher 200 (FIG.4).

Thus, both for the operation for gripping the shell and its release, the device does not use any actuator which consumes energy (such as a motor or a cylinder). The device is thus simpler and more reliable than those known in the prior art. Furthermore, the device ensures a better stability of the shell by providing jaws the profile of which is adapted to the different sections thereof.

CLAIMS

1 - A shell (100) gripping device (1), comprising at
5 least one pair of jaws (5) for holding a shell (100), each jaw
(5) pivoting between an open position and a closed position
around a pivot axis (6) parallel to the longitudinal axis
(101) of the shell (100), the pivot axis (6) of each jaw (5)
being located between a lower end (5b) and an upper end (5a)
10 of the jaw (5), the upper end (5a) of each jaw (5) allowing to
close the jaw (5) by abutting this upper end (5a) against a
shell (100) to be gripped, the upper end (5a) of each jaw (5)
being provided with a notch (7) for interfering with a lug
(11) of a cam (9) to hold the jaws (5) in the closed position,
15 the cam (9) being integral with a pivoting blade (13) the
pivoting of which allows to pivot the cam (9) and to thus
disengage the lug (11) from the rotating trajectory of the
notch (7) of the jaw (5), thereby releasing the opening of the
jaw (5), the gripping device (1) being characterized in that
20 the cam (9) has a stop (8) for limiting the opening stroke of
the jaw (5).

2 - The gripping device according to claim 1,
characterized in that it has two pairs of jaws (5) and two
pairs of cams (9), each pair of jaws (5) and of cams (9) being
25 arranged to be able to be positioned at a vicinity of a
different end of a shell (100) to be gripped.

3 - The gripping device (1) according to one of
claims 1 and 2, characterized in that each cam (9) is made
integral with a blade (13) by a shaft (14).

30 4 - The gripping device (1) according to one of
claims 1 to 3, characterized in that it has a fastening
interface (4) for making the device (1) integral with a
lifting means.

5 - The gripping device (1) according to one of claims 1 to 4, characterized in that it has an elastic means (12) for biasing the cam (9) and the blade (13) back in a position tending to block the opening of the jaws (5).

5 6 - The gripping device (1) according to one of claims 1 to 5, characterized in that it has at least one block (15) in its rear part which is intended to abut against a rear face of the base of the shell in order to position the latter longitudinally with respect to the device.

10 7 - A stretcher (200) intended to accommodate a shell (100) in a substantially horizontal position, the stretcher (200) being characterized in that it has an abutment area (203) for interfering with a blade (13) of a gripping device (1) according to one of claims 1 to 6.