The invention relates to an igniter for a pyrotechnic device with a housing in which a striker pretensioned by a spring is held by a releasable locking device at a distance from a bearing for a detonating device, such as a percussion cap, piezoelectric element or the like, an actuating mechanism which is coaxial with the striker, accessible from the outside of the housing, and mounted on a bearing such that it can be slided and/or rotated in the housing to trip the igniter by tensile force and/or pressure and/or torsional force acting on the locking device. An igniter of this type is known from CH-A-608,603.

The majority of military explosive charges and pyrotechnic signalling and illuminating means are provided with a female screwthread into which an igniter is screwed. The igniters themselves are constructed as tensile, pressure or torsional igniters, that is to say they can be tripped by the action of a tensile force, pressure or torsional force on an actuating mechanism. So-called three-way igniters are also known, in which the actuating mechanism can be actuated in all three ways mentioned above, for tripping .

A three-way igniter has already been proposed in which the striker, which is pretensioned by a spring is provided with an enlarged head which is retained gripper fashion in plastic jaws (CH-A-608,603). An actuating mechanism is arranged between the plastic jaws which has wedge-shaped lugs, which engage in corresponding recesses of the jaws, and an oval configuration. By the action of tension or pressure on the actuating mechanism, the lugs spread the jaws apart, by which means the head of the striker is released. On the other hand, the jaws are spread apart on rotation of the actuating mechanism due to its oval configuration.

In another known three-way igniter the head of the striker is retained in the same manner, the jaws being constructed clothes-peg fashion and being tensioned towards each other by a spiral spring. The actuating mechanism presents the form of an oval ring which acts on tapered

presents the form of an oval ring which acts on tapered surfaces on the jaws (CH-B-650,074).

The known igniters of this and other types have the disadvantage that the desired close tolerances cannot be maintained in mass production, so that relatively wide deviations in the tripping force occur from one igniter to another, and tripping is also found to be dependent on temperature.

The object of the invention is to eliminate the disadvantages stated and to provide an igniter, the tripping force of which is not dependent on temperature and for which the production tolerances per se can be kept close and also have a considerably smaller influence on the tripping force, so that the latter is virtually the same from one igniter to another.

This object is achieved by an igniter of the initially stated type, in that according to the invention the striker and the actuating mechanism are constructed as telescopically interacting components of which the outer has at least one opening and the inner at least one recess, and that the locking device has at lease one stop which is mounted in the opening and which engages in the recess, and has a projection which is fixed to the housing and on which the stop which engages in the recess is supported.

Comparatively weak tripping forces, which can be maintained precisely for each igniter, are obtained in this manner.

In a preferred embodiment of the invention the spring which pretensions the striker enclosed by the actuating mechanism is supported by the actuating mechanism.

Especially low friction is obtained if each stop is constructed as a ball, each opening as a radial bore and the recess as an annular groove.

Simplifications in production technology are obtained if each projection is formed on an insert attached to the housing. The insert may then be formed by a bush which is provided internally with a gill with tapered

To secure the position of the ball, at least one projection may be provided with a notch interacting with the stop or provided with a pair of bosses.

In order to adjust a predetermined tripping force for the tensile or pressure tripping, two opposed springs, which are each supported by the housing, may act on the actuating mechanism.

In addition to the known safety means in the form of a pin which passes through the housing and the actuating mechanism, the igniter may also be provided with a further safety element which is arranged between the striker and the bearing for the detonating device.

The invention is explained more fully below with reference to a preferred exemplary embodiment which is illustrated in the drawings, in which

Fig. 1 shows a longitudinal section through the igniter and

Fig. 2 shows a section along the line II-II in Fig. 1.

The igniter according to the invention has a housing 1 in which an actuating mechanism 2 is mounted such that it can be slid and rotated. The actuating mechanism 2 is provided at its end 3, which projects out of the housing 1, with a square attachment 4, upon which a plate 5 with four recesses 6 for hooking a trip wire is positioned.

The actuating mechanism 2 is of cylindrical construction and is provided at its end 7, which is remote from the plate 5 and is located in the housing 1, with an axial bore 8 in which a cylindrical striker 9 is mounted such that it can be slid. A spring 11 is provided between the striker 9 and the base 10 of the axial bore 8. Approximately in the centre of its length, the actuating mechanism 2 has two openings 12, each in the form of a bore, the axes of which lie on a line in a plane perpendicular to the longitudinal axis of the actuating mechanism 2 (and of the striker 9).

A stop 13 in the form of a ball is arranged in each each opening 12 or bore, the diameter of said ball corresponding to that of the bore. The actuating mechanism

A stop 13 in the form of a ball is arranged in each each opening 12 or bore, the diameter of said ball corresponding to that of the bore. The actuating mechanism 2 is provided in the area of the openings 12 with a collar 14 which on the one hand creates a greater length of the openings 12 (considered in the radial direction of the actuating mechanism 2), and therefore good guidance for the stops 13, and on the other hand serves as an abutment to support two springs 15 and 16, which act upon both sides of the collar 14 and are supported against the housing 1 at their other ends. The tripping force for the tensile or pressure tripping of the igniter is adjusted by means of these springs 15,16, as mentioned.

The stops 13 serve to lock the striker 9, which has for this purpose a recess 17 in the form of an annular groove adapted in cross-section to the diameter of the ball, the cross-section corresponding to an arc of less than 180^{o}.

The stops 13 or balls are retained in their position of engagement in the recess 17 or annular groove by the fact that, at the outside which is radial relative to the actuating mechanism 2, they are each in contact with a projection 18 . The projections 18 are advantageously constructed on an insert 19 which is fixed by means of a distance sleeve 20 on a shoulder 21 of the housing 1. The housing 1 is conveniently of two-part construction; the two parts are screwed together, the screw fitting 22 being arranged in the area of the distance sleeve 20. The housing part in which the distance sleeve 20 is located is provided with a female screwthread, and the other housing part is provided with a male screwthread which is constructed on an attachment which serves as a support for the distance sleeve 20.

The insert 19 has the form of a bush which has on its inside a central cylindrical section 19a and two flanks 19b, 19c adjacent to the latter on both sides and widened conically outwards. In the circumferential direction the annular insert 19 also has an axial recess 23 on each of the two sides of each area assigned to the respective

projection 18 (Fig. 2), the dimensions of said recesses being adapted to the stops 13, as explained below.

As the drawing shows, when the balls are fully engaged in the annular groove their centres lie radially outside the cylindrical envelope surface of the striker 9. The dimensions of the recesses 23 in the insert 19 are at least sufficiently large for the balls which are in contact with the cylindrical envelope surface of the striker 9 to pass freely through said recesses 23. The interior of the housing is preferably dimensioned larger than corresponds to the recesses 23.

A bearing 24 for a percussion cap is provided on the side of the housing 1 opposite the plate 5 of the actuating mechanism 2. An ignition duct 25 which exits at the outside of the housing 1 adjoins the bearing 24.

A yoke-shaped safety element 26 is arranged between the bearing 24 and the adjacent end 7 of the actuating mechanism 2 and prevents the striker 9 from striking the percussion cap and can be withdrawn from outside the igniter, for example even from a remote position by means of a cord or the like. This safety element 26 is provided in addition to a safety pin 27, customary per se, which passes through housing 1 and actuating mechanism 2.

At least one of the projections 18 is provided in the centre of its surface facing the stop 13 with a notch 28, two juxtaposed bosses or the like, which offers a slight resistance to the relative movement between stop 13 and projection 18.

As protection against penetrating moisture, seals 29 are provided in the manner shown between the individual components of the igniter, particularly between the housing 1 and the actuating mechanism 2. A seal 29 is likewise provided on a tubular attachment 30 of the housing 1 which prolongs the ignition duct 25.

The tripping of the igniter according to the invention occurs in the following manner.

After removal of the two safety elements 26 and 27, the actuating mechanism 2 is cocked and may be slid in the

housing 1 by tension or pressure, and also rotated in the housing 1 by a torque.

In the case of a predetermined tensile force or compressive force on the actuating mechanism 2 which exceeds the force of the respective counteracting spring 15 or 16, the actuating mechanism 2 is slid into the housing 1 until the stops 13 cease to be supported by their projections 18. Because the striker 9 pretensioned by the spring 11 acts on the stops 13 or balls, the stops 13 are pressed radially outwards; at the moment when there is no further support by the projections 18, the stops 13 can escape radially outwards and slide and/or roll across the corresponding conical flanks 19b,19c until they have been pushed completely out of the recess 17 or annular groove of the striker 9. The striker 9 subject to the action of the spring 11 is now released and is driven in the axial bore 8 of the actuating mechanism 2 onto the percussion cap located in the bearing 24.

In the case of rotation of the actuating mechanism 2, the stops 13 are guided via the projections 18 until they enter the recesses 23 of the insert 19 and can therefore move out of the recess 17 of the striker 9, so that the striker 9 is released.

In all cases it is necessary during tripping to overcome (possibly by elastic deformation of material) the slight resistance which exists due to the "catching" of the stop 13 in the notch 28 of the projection 18 and which informs an operator, for example, that the stop 13 has been moved out of its initial position.

Sundry variants are possible within the ambit of the invention. For example, the stops 13 may have a shape other than spherical, provided that a similar cooperation with the recess 17 of the striker 9 is ensured. Likewise the recess 17 may have a wedge-shaped or V-shaped cross-section instead of the substantially semicircular cross-section.

Furthermore, the igniter may be constructed purely as a tension, pressure or torque igniter or as a tension and pressure igniter or as a pressure and torque igniter.

In such cases the striker may be provided with a bore and the actuating mechanism, which is provided with the recess, mounted in the said bore, whereas the striker has the openings to receive the stops.

The number of the stops may also be varied, in which case however they are preferably all arranged in a common plane perpendicular to the longitudinal axis of the striker and at equal angular intervals in said plane.

A piezoelectric element may be provided instead of the percussion cap.

The igniter according to the invention is extremely safe in operation because on the one hand it has a double safety device, namely one safety element acting on the actuating mechanism and one acting on the striker, and on the other hand it ensures reliable tripping due to the relative movements with low friction.

* C L M S *

(20)

Patent Claims

1. Igniter for a pyrotechnic device with a housing (1) in which a striker (9) pretensioned by a spring (11) is held by a releasable locking device at a distance from a bearing (24) for a detonating device such as a percussion cap, piezoelectric element or the like, an actuating mechanism (2), which is coaxial with the striker (9), accessible from the outside of the housing (1) and mounted such that it can be slid and/or rotated in the housing (1) to trip the igniter by tensile force and/or compressive force and/or torsional force, acting on the locking device, characterized in that the striker (1) and the actuating mechanism (2) are constructed as telescopically interacting components of which the outer has at least one opening (12) and the inner at least one recess (17), and that the locking device has at least one stop (13), which is mounted in the opening (12) and which engages in the recess (17), and has a projection (18) which is fixed to the housing and on which the stop (13) which engages in the recess (17) is supported.

2. Igniter according to Claim 1, characterized in that the spring (11) which pretensions the striker (9) enclosed by the actuating mechanism (2) is supported by the actuating mechanism (2).

3. Igniter according to Claim 1 or 2, characterized in that each stop (13) is constructed in the form of a ball, each opening (12) as a radial bore and the recess (17) as an annular groove.

4. Igniter according to Claims 1 to 3, characterized in that each projection (18) is formed on an insert (19) attached to the housing (1).

5. Igniter according to Claim 4, characterized in that the insert (19) is formed by a bush which is provided internally with a gill (19a) with tapered flanks (19b, 19c) and which has an axial recess (23) on each side of an area opposite the stop (13) to form the projection (18).

6. Igniter according to Claims 2 to 5, characterized in that at least one projection (18) is provided with a

notch (28) interacting with the stop (13) or provided with a pair of bosses.

7. Igniter according to Claims 1 to 6, characterized in that two opposed springs (15, 16) which are each supported by the housing (1) act on the actuating mechanism (2).

8. Igniter according to Claims 1 to 7, characterized in that a safety element (26) is arranged between the striker (1) and the bearing (24) for the detonating device.