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(54) Benevnelse **LARGE CALIBRE WEAPON HAVING CASE HEAD DEFLECTOR**

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The technical field of the invention is that of large-caliber base deflectors, large-caliber weapons equipped with such deflectors, as well as methods for deflecting bases.

Patent application FR2714158 discloses a device for deflecting the trajectory of the bases projected from a breech of a weapon after ammunition has been fired from a turret of an armored vehicle.

To this end, the device includes a flexible deflector consisting in a curved plate that can be moved relative to the weapon and can be placed facing the longitudinal axis of the weapon. The deflector is directed so that a base ejected from the weapon strikes the deflector, which cushions the impact and deflects the base towards a base bag located downwards, under the joint for pivoting the turret in traverse. When the deflector is not in use, it is retracted under the weapon, together with the bag containing the previously ejected bases.

Such a deflector encroaches significantly on the volume surrounding the weapon. Such an encroachment is not compatible with the cramped environments that may be encountered, for example in a vehicle turret, and in particular if the turret is located entirely above the joint plane that separates it from the chassis, and therefore if it has no communication path with the chassis of the vehicle.

Patent EP1338858 also discloses a base deflector that is integral with a cradle and includes a panel located at a distance from a base ejection opening. The panel is integral with a fixed part of the weapon and it is therefore positioned behind the breech at a distance that must be compatible with the weapon’s recoil. Such a deflector also encroaches on the volume surrounding the weapon and does not make it possible to reduce the overall dimensions.

Finally, patent US4919038 describes a case collector including a panel located at a distance from a case ejection

opening to deflect the trajectory of a case. Here again, the panel must be located at a significant distance from the breech and the volume required for such a device is large.

The invention aims to solve this problem of volume.

The invention thus relates to a large-caliber weapon characterised in that it is equipped with a base deflector weapon at a base ejection opening in the vicinity of a breech of the weapon, the deflector including a panel attached, by one of its edges, to the weapon, wherein the panel is attached to the weapon by an articulation and the deflector includes an actuator positioned on a rear face of the breech of the weapon and capable of pivoting the panel between a deflection position in which the deflector is positioned on the ejection trajectory of a base in order to deflect it, and a folded position in which the panel is placed over the breech, in a vicinity thereof.

Advantageously, the panel has an axis of articulation that is inclined at a first angle relative to a vertical plane passing through a longitudinal axis of the weapon.

Advantageously, in the deflection position, the plane of the panel is inclined at a second angle relative to the longitudinal axis of the weapon.

Advantageously, the first and second angles are substantially equal to 45°.

Advantageously, the axes of the ends of the actuator are never aligned with the axis of articulation of the panel.

Advantageously, the breech includes a boss intended to prevent alignment of the axes of the ends of the actuator and the axis of articulation.

The invention also relates to a method for deflecting a base ejected from a weapon according to the invention, wherein the method is characterized in that: the panel is brought into the deflection position when the weapon has just been placed

in battery; the panel is brought into the folded position approximately one second after the breech is opened.

The invention will be better understood from the following description, which is made with reference to the attached drawings, in which :

[Fig. 1] shows a detail view of a deflector according to the invention;

[Fig. 2] shows a detail view of a weapon equipped with a deflector according to the invention in a folded position;

[Fig. 3] shows a detail view of a weapon equipped with a deflector according to the invention in a deflection position; and

[Fig. 4] shows a schematic view of a turret provided with a deflector according to the invention.

According to Figures 1 and 2, a deflector 1 according to the invention includes a substantially flat panel 2 which is provided, on one of its edges, with an articulation 3 which connects it to a rear face of a breech 101 of a weapon. The deflector also includes an actuator 4 arranged laterally relative to the panel 2.

The actuator 4 here is an electric cylinder with a rod T which is connected by a first pivot connection 4a to one end 2a of the panel, opposite the end carrying the articulation 3. The actuator 4 is also connected by a second pivot connection 4b to the breech 101 of the weapon.

It can be seen in Figure 1 that the axis 3a of the articulation 3 is not aligned with the first pivot connection 4a and the second pivot connection 4b in order to avoid an over-center situation during the retraction of the rod T of the cylinder 4.

According to Figure 2, a large-caliber weapon 100 includes the breech 101 which is closed by a vertically movable breech block 102.

The deflector 1 according to the invention is located on a rear face of the breech 101, in the vicinity of an opening 103 of the breech, wherein the opening 103 is intended for the loading of a piece of ammunition and for the discharge of a base after fire (piece of ammunition and base not shown).

As previously mentioned, the panel 2 is connected to the breach 101 by means of the articulation 3, the axis 3a of which is inclined at a first angle α of approximately 45 degrees relative to a vertical plane P passing through the longitudinal axis X of the weapon.

The deflector 1 is shown in the folded position, i.e. the panel 2 is placed over the rear face of the breach 101, as closely as possible to it.

The cylinder 4 has its rod T extended and is substantially parallel to the rear face of the breech 101. The device 1 thus protrudes as little as possible from the rear face of the breech, which greatly limits the volume required behind the weapon. This volume required by the deflector 1 is at most equal to the maximum thickness E of the cylinder 4.

It was noted in Figure 1 that the axis 3a of the articulation 3 is not aligned with the first 4a and second 4b pivot connections of the rod T of the cylinder 4 in order to avoid an over-center situation when the rod T of the cylinder 4 is retracted.

To ensure this misalignment, the breach 101 includes a boss 9 which prevents the axes 4a and 4b of the pivot connections of the cylinder 4 and the axis 3a of the articulation 3 from being aligned with one another.

The boss 9 may optionally include a spring-loaded plunger 9a which acts against the folding action of the panel 2, to facilitate positioning that tends to return the panel 2 to its deflection position.

As an alternative, it is obvious to the person skilled in the art that the boss 9 and the plunger 9a can be carried by

the panel 2 itself. However, this alternative would impose additional weight on the panel 2 and the solution of positioning the boss 9 on the breech 101 is therefore preferred.

It can also be seen in Figure 2 that, in its folded position, the panel 2 is completely clear of the opening 103 and is located at a distance from this opening, which enables unhindered loading of a piece of ammunition.

As previously mentioned, this folded position also minimizes the space that the deflector 1 takes behind the breech 101, allowing reloading and recoil of the weapon without the deflector 1 interfering with any neighboring equipment.

According to Figure 3, the weapon has just been placed in battery after firing.

In a conventional way and as well-known to the person skilled in the art, the return to battery includes a movement of the breech block 102 of the breech to its initial position and it is ensured thanks to the action of elastic links (links not shown) which return part of the recoil energy.

After firing, only the base of the piece of ammunition remains in the chamber of the weapon 100, the projectile having been fired and the rest of the case having been consumed.

Just before the opening of the breech block 102, which triggers the ejection of the base, the panel 2 of the deflector 1 is pivoted by the cylinder 4, which, by retracting its rod T, positions the panel 2 facing the opening 103, on a first ejection trajectory of the base, with an angular orientation β of the plane P2 of the panel relative to the longitudinal axis X of the weapon 100 (Figure 3 shows schematically a main direction of the plane P2 parallel to an edge of the panel 2).

Thus the base, which is ejected along a first trajectory directed towards the rear and along the longitudinal axis X of the weapon 100, will strike the panel 2, which will deflect it and impart to it a second trajectory.

The base is ejected from the breech 101 by spring means well known to the person in the art (base and spring means are not shown).

The person skilled in the art will choose the direction of the second trajectory by adjusting :

- the first angle α of the axis 3a of the articulation 3 relative to the vertical plane P passing through the longitudinal axis X of the weapon (which defines the deflection of the base in a vertical direction);
- the second angle β of the plane P2 of panel 2 relative to the longitudinal axis X of the weapon (which defines the deflection of the base in a direction lateral to the weapon).

The combination of these two deflections makes it possible to import to the base a trajectory Δ that enables it to reach a base bag positioned near the weapon (Figure 4).

According to Figure 4, by selecting angles α and β of substantially 45 degrees for each angle, the base C will be deflected laterally to the weapon and upwards.

Figure 4 thus shows a military vehicle turret 20 including a weapon 100 whose breech 101 is equipped with a deflector 1 whose panel 2 advantageously enables the ejection of the bases C towards a base receptacle 10 which is located in the turret 20, above a joint plane 40 of the turret 20 relative to a chassis 30 of the vehicle. The arrow Δ represents schematically the trajectory of the ejected base.

Approximately one second after the breech is opened, the deflector 1 is returned to its folded position, clearing access to the weapon chamber. This time period of at least one second is considered necessary to make it possible to eject a base under proper conditions and without slowing down the loading of a new projectile into the weapon.

The invention therefore solves the problem of volume at the rear of a breech as mentioned in the preamble, but it also prevents any intrusion below the joint plane of the turret.

P a t e n t k r a v

1. Grovkalibret våpen (100), k a r a k t e r i s e r t v e d at det er utstyrt med en bunn-avbøyer (1) ved en bunn-utkastingsåpning (103), i nærheten av et bakstykke (101) av våpenet (100), idet avbøyeren (1) innbefatter et panel (2) som ved én av sine kanter er festet til våpenet (100), hvori panelet (2) er festet til våpenet (100) med en leddforbindelse (3), og avbøyeren (1) innbefatter en aktuator (4) som er plassert på en bakside av våpenets (100) bakstykke (101) og i stand til å dreie panelet (2) mellom en avbøyingsposisjon hvor avbøyeren (1) er plassert på utkastingsbanen for en bunn, for å avbøye den, og en sammenfoldet posisjon hvor panelet (2) er plassert over bakstykket (101), i nærheten av dette.

2. Grovkalibret våpen (100) ifølge krav 1, k a r a k t e r i s e r t v e d at panelet (2) har en leddakse (3a) som er skråstilt i en første vinkel (α) i forhold til et vertikalt plan (P) som går gjennom en lengdeakse (X) i våpenet (100).

3. Grovkalibret våpen (100) ifølge krav 2, k a r a k t e r i s e r t v e d at, i avbøyingsposisjonen, planet for panelet (2) skråstilt i en andre vinkel (β) i forhold til våpenets (100) lengdeakse (X).

4. Grovkalibret våpen (100) ifølge krav 3, k a r a k t e r i s e r t v e d at den første og andre vinkelen (α, β) hovedsakelig er lik 45°.

5. Grovkalibret våpen (100) ifølge hvilket som helst av kravene 1 til 4, k a r a k t e r i s e r t v e d at aksene i aktuatorens ender aldri er innrettet med panelets leddakse (3a).

6. Grovkalibret våpen ifølge krav 5, k a r a k t e r i s e r t v e d at bakstykket innbefatter et fremspring (9) tilsiktet å forhindre innretting av aksene (4a, 4b) i aktuatorens (4) ender og leddaksen (3a).

7. Fremgangsmåte for avbøying av en bunn kastet ut fra et våpen (100) ifølge hvilket som helst av kravene 1 til 6, k a r a k t e r i s e r t v e d at: panelet (2) bringes til avbøyingsposisjonen når våpenet (100) nettopp har blitt gjort skuddklart; panelet (2) bringes til den sammenfoldede posisjonen ca. ett sekund etter at bakstykket er åpnet.

[Fig. 1]

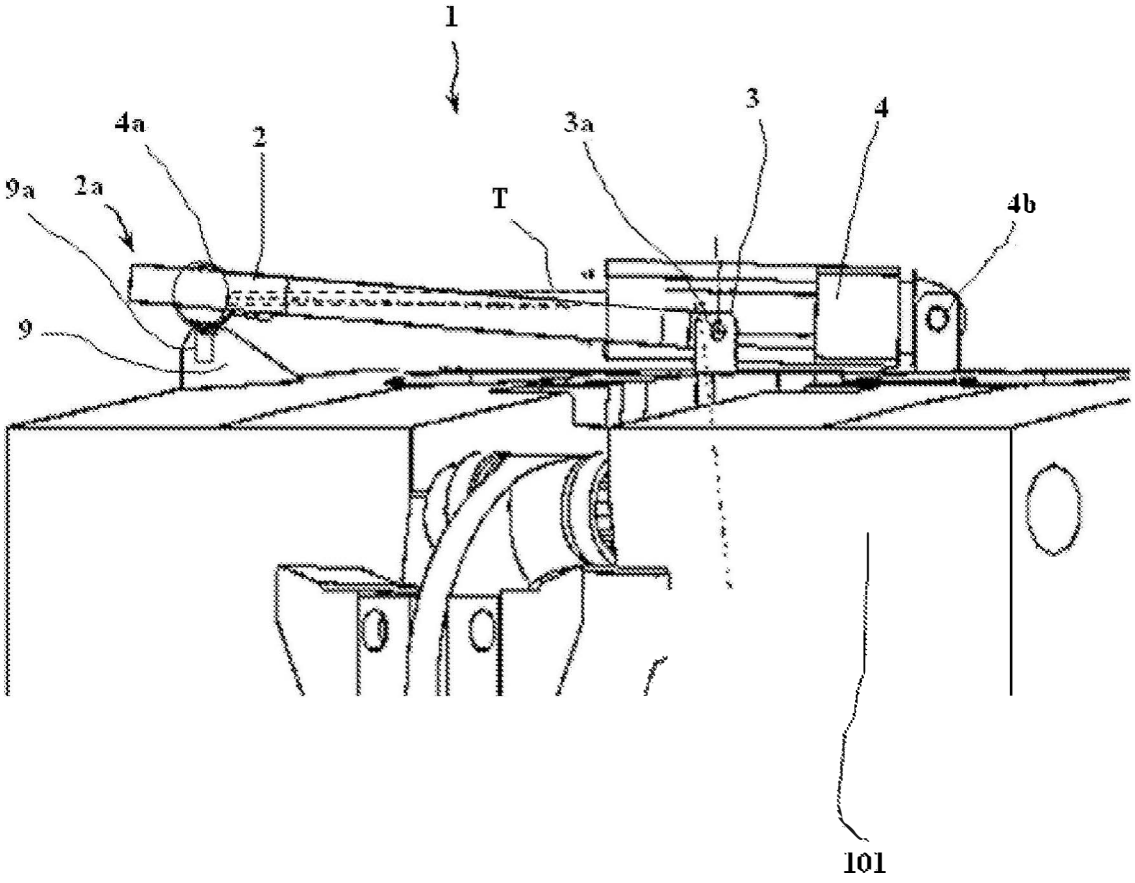

Fig. 1

[Fig. 2]

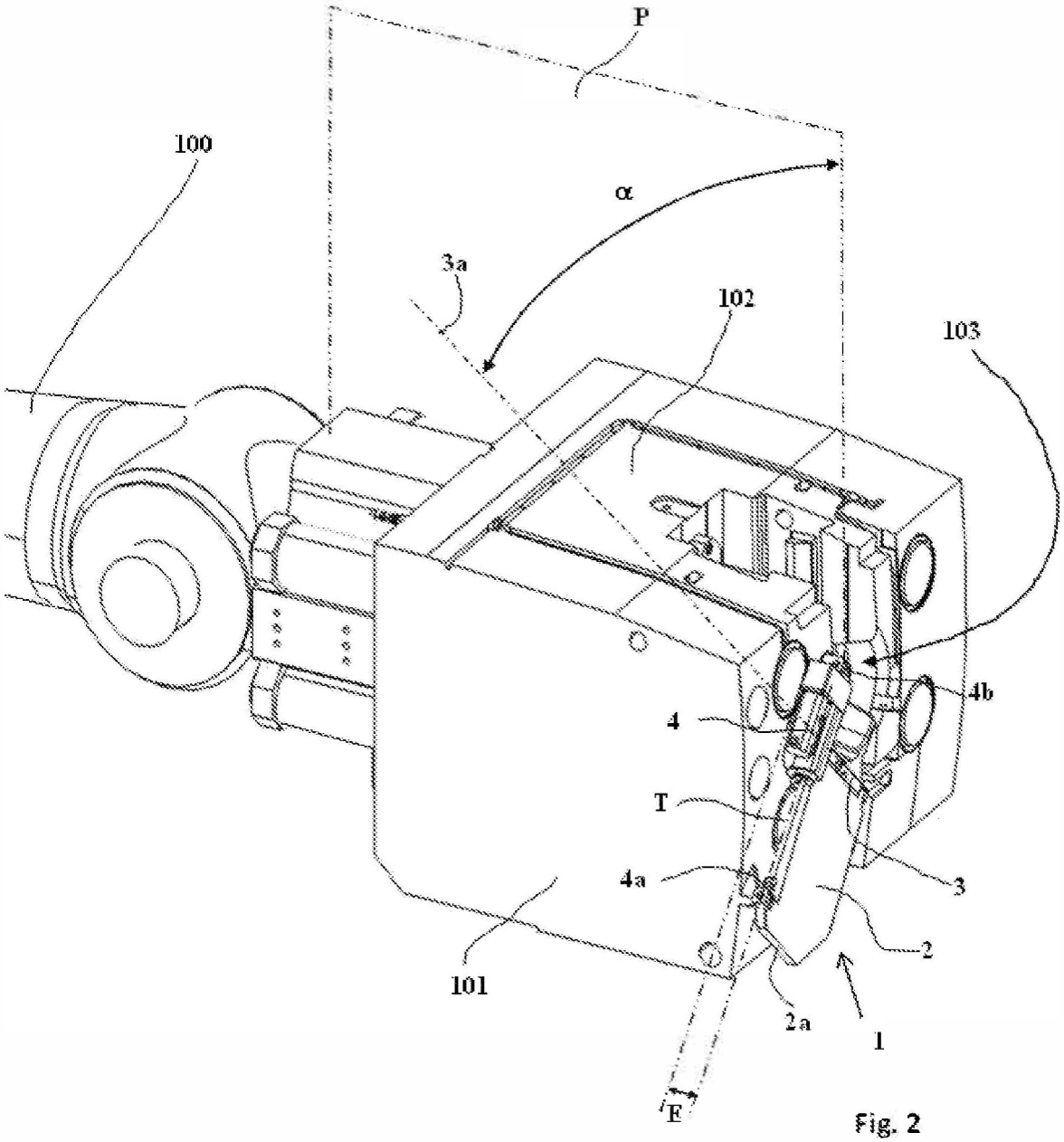

Fig. 2

[Fig. 3]

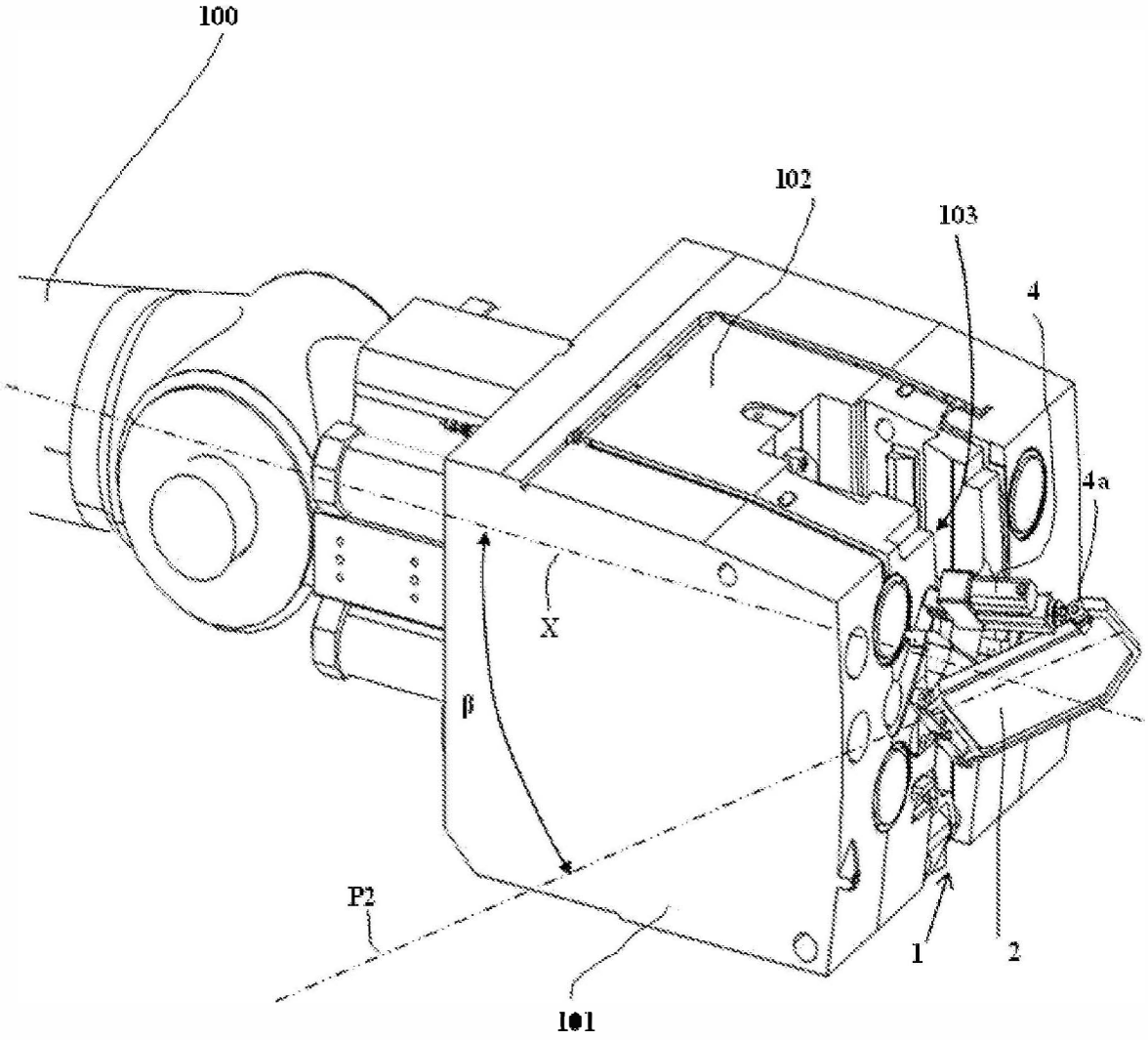

Fig. 3

[Fig. 4]

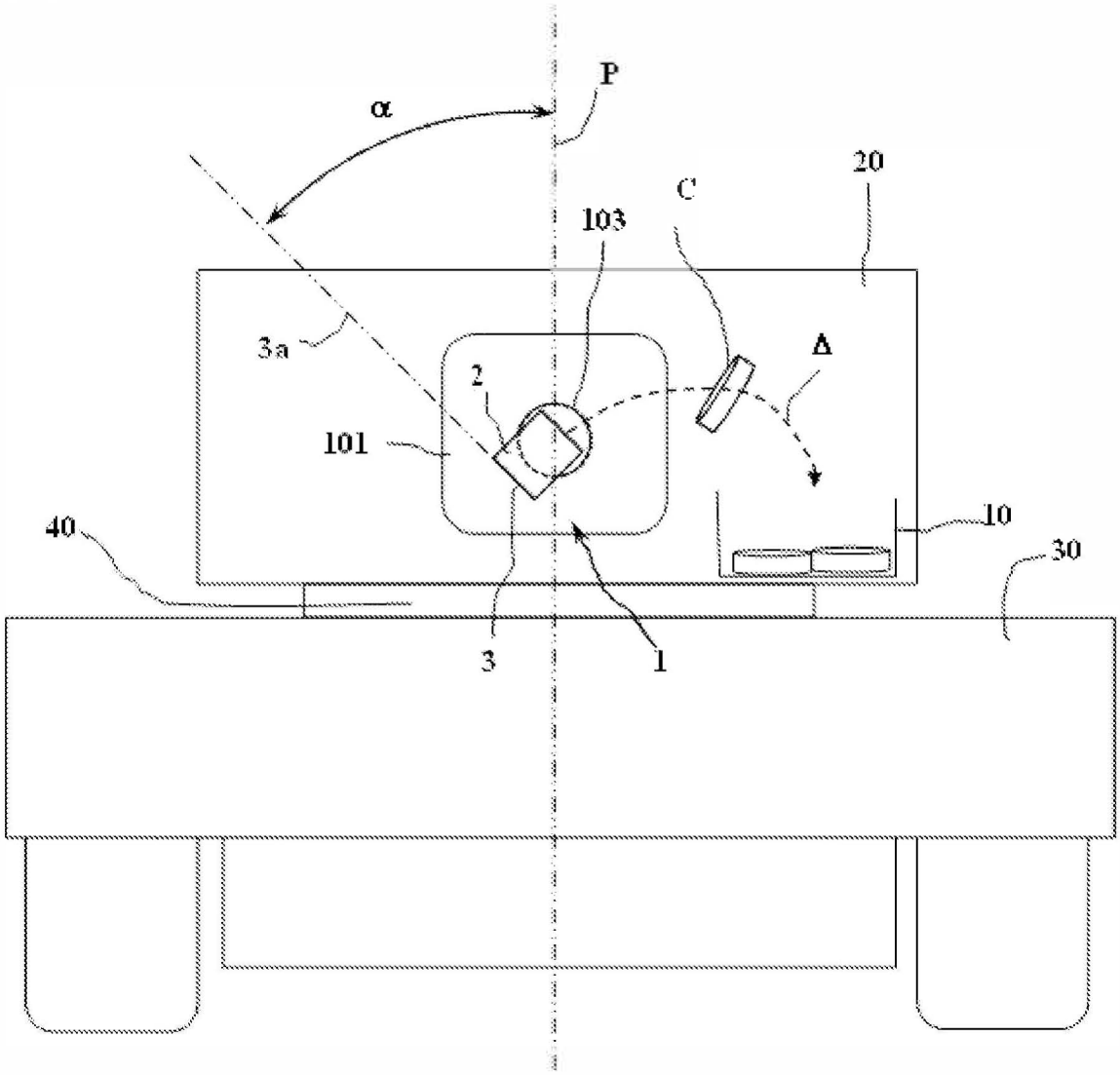

Fig. 4