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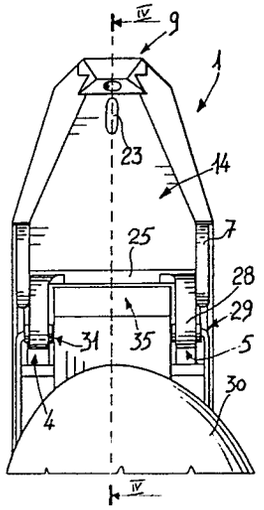
(71) Applicant: **ICARO OLIVIERI & C. Minuterie Metalliche S.p.A., Via Feltrina Sud 87/A, I-31044 Montebelluna Treviso (IT)**

(72) Inventor: **Callegari, Mario, Via Ambrosi 33, I-31030 Biadene Di Montebelluna Treviso (IT)**

(74) Representative: **Staub, Gabriella, Dr. et al, STAUB, JOSIF Via Meravigli 16, I-20123 Milano (IT)**

(54) Ski binding for cross-country skiing.

(57) The ski binding for cross-country skiing comprises a plate associable with a ski and having lateral engagement grooves (6) for a pin (29) forwardly projecting from a toe piece (14) of a footwear article (30). With the plate there is associated an elastically oscillable element (35) adapted to permit disengagement of the footwear. A locking element (24) of the pin is journalled in the grooves (6) and cooperates with an adjustable safety element (17) associated with a toe piece (14) journalled to the plate itself. Further, the locking element (24) cooperates with an elastically deformable element (33) adapted to permit disengagement during the phase of opening of the locking element (24) from the pin. Furthermore, to the plate (2) there is journalled a release element (9) cooperating with prearranged engagement elements (22) formed at the toe end of the footwear.



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"SKI BINDING FOR CROSS-COUNTRY SKIING"

This invention relates to a ski binding for cross-country skiing.

Known design bindings employed for cross-country skiing comprise nowadays just the forward binding, with which the toe end of the footwear is removably associated.

Owing to the particular movement performed by the athlete, that binding is also required to enable the footwear to perform a reciprocating pivotal movement with respect to the rest surface consisting of the ski.

Some known binding types have, therefore, projecting lugs, located on a plate rigid with the ski and with an upper locking element, which are inserted into conforming seats formed in the footwear toe piece.

A problem encountered with such prior types is that the side play afforded for the footwear, in combination with the fact that the oscillation of same is borne by the toe portion of the footwear end which is subjected to considerable stresses and consequent fast wear.

A partial solution to the latter problem is represented by known bindings which provide engagement seats for a pin the ends whereof, being bent, protrude sideways from the toe of the footwear sole.

In such known types, the engagement seats are formed on two discrete elements forming the binding, such elements cooperating together they being allowed a displacement along the same longitudinal axis.

The main drawback to be found, due to the binding

structure, is that it is impossible to have safety opening in the event of the athlete falling, together with the difficulty of the latter inserting the pin of the footwear into the pre-arranged seats, it being necessary to overcome the force of elastic elements interposed between the two elements forming the binding and adapted to restrict the longitudinal travel between the two.

It is the primary aim of this invention to eliminate such prior disadvantages, by providing a ski binding for cross-country skiing which allows association therewith, in a quick and easy manner, of tne footwear, the latter requiring no particular accessory for application to the sole.

Within the above aim it is an important object to provide a ski binding for cross-country skiing which allows the footwear to always release therefrom in a quick and easy manner for the athlete.

A further important object is to provide a ski binding which affords release, in a safe condition, of the footwear even in the event of the athlete falling, that release being also afforded sideways of the binding.

Another important object is to provide a binding which enables the athlete to preset the threshold for release of the footwear in a safe condition.

A not least object is to provide a binding which allows optimum oscillatory movement of the footwear while skiing.

The above aim and objects and other objects which will become apparent hereinafter are achieved by a ski binding for cross-country skiing, characterized in that it comprises a plate associable with a ski and having laterally two engagement grooves for a pin projecting forwardly of the footwear toe piece, with said plate there is associated an elastically oscillable element and there is journalled an element for locking said pin in the guides, said element cooperating with an elastically deformable means, adapted to permit disengagement during the phase of opening the locking element from the pin, and with an adjustable safety element associated with a toe piece journalled idly on the plate, said toe piece having means of engagement with the plate and with a release element journalled to the plate itself.

Expediently, the toe piece may have means of displaying the safety element adjustment.

Further features and advantages of the invention will be more clearly apparent from the detailed description of a particular embodiment, shown by way of illustration and not of limitation in the accompaniyng drawing sheets where:

Figure 1 is a top plan view of the binding with the toe end of a footwear article associated therewith;

Figure 2 is a fragmentary exploded view of the binding;

Figure 3 is a three-quarter bottom plan view of the binding toe piece;

Figure 4 is a view taken in the section plane IV-IV of Figure 1;

Figure 5 is a similar view to the preceding one showing the phase of release;

Figure 6 is a similar view to Figure 5, showing the released condition and therefore the following phase of pre-setting for insertion of the toe end of the footwear article.

With reference to the previously cited figures, the binding 1 usable for practicing cross-country skiing is shown to comprise a plate 2 having, at the rear end 3 thereof, two side elevations 4 and 5 on the end of which there is formed, along the same transverse axis with respect to the plate 2, a groove 6.

Laterally of the plate 2 there also project two shoulders 7, advantageously identical to each other, of trapezoidal shape, and radiused forwardly to two longitudinal arms 8, expediently identical and parallel to each other, at their free end there being journalled idly a release element 9 consisting essentially of a nib having a substantially U-like shape having a longer flat wing 10, and an other wing 11 having a dog or tooth 12 engaging in a seat 13 formed at the forward end of a toe piece 14.

The latter is journalled at the holes 15 formed on the shoulders 7 and has a longitudinal through-going seat 16, expediently partially-threaded for screw thread engagement relationship with an adjustable safety element 17 consisting of a screw 18 and a pin 19

projecting from the rear end 20 of the toe piece, said screw and pin having a pre-arranged seat for the interposition of an elastically deformable element consisting, for instance, of a cylindrical coil spring 21 adapted for working by compression.

The toe piece 14 advantageously has downwardly two means of engagement 22 with the plate 2 consisting of longitudinal seats conforming with the arms 8.

Upwardly of the toe piece there is instead expediently formed an opening 23 communicating with the seat 16 and being adapted to allow adjustment of the element 17 to be displayed.

The latter cooperates with a locking element 24: in fact the terminating end of the pin 19 rests on the corresponding end of a crossbar 25, of slightly arcuate shape, rigidly associated at its ends with two longitudinal arms 26, journalled to the shoulders 7 at the holes 27, as well as with two more longitudinal arms 28, arranged on the opposed side from the arms 26 and having the terminating ends thereof slightly bent arcuately and adapted to lock, at the grooves 6, a pin 29 projecting forwardly of the toe piece of a footwear article 30.

Advantageously, the pin 29 has idler sleeves 31 at the interspace between the grooves 6 and the ends of the arms 28, such sleeves favoring the athlete's stride movement.

At approximately the transverse mid-axis the bar 25 has a hooking dog 32 for a cylindrical coil spring 33 working in compression housed in a pre-arranged

seat formed on the plate 2, said spring enabling disengagement during the opening phase of the locking element 24 from the pin 29, as shown in Figure 6.

To the shoulders 7 of the plate 2 there is also journalled idly, at the holes 34, an elastically oscillable element 35, expediently having a substantially parallelepipedal shape, which has, at the transverse mid-axis, a nib 36 insertable into a correspondingly shaped milling 37 formed on the plate 2 and abutting on the closed end of same.

At the lower side edges the element 35 has a pair of hooking holes 38 for the end of a pair of springs 39 hooked at the other end on the pivot pin of the element 24, sucn springs being partly housed in seats 41 formed on the plate, the bar 25 having in turn side grooves adapted to prevent interaction of the springs themselves with the bar.

The plate 2 further has, at the end of the arms 26, slots 42 housing such ends.

The element 35 has rearwardly a substantially flat surface adapted to allow a perfect rest position to be assumed by the terminating end of the toe piece of the footwear article 30.

In practicing cross-country skiing tne athlete will thus impart during the stride a partial rotation to the element 35, whicn rotation is restricted by the presence of the springs 33 which also favor return to the parallel position to the ski of the footwear article.

To associate the latter with the binding 1, it

will be necessary to position the sleeves 31 at the grooves 6 of the elevations 4 and 5, thereafter the athlete shall have to merely impose a rotation on the toe piece 14 causing its bottom end to engage with the flat wing 10 of the release element 9, that wing imposing the successive insertion of the dog 12 into the seat 13 formed on the toe piece itself.

During the closing phase of the binding, the end of the bar 25 will force the pin 19 into the seat 16, compressing therefore the spring 21 interposed to the screw 18.

The safety element 17 allows, in the event for example that the athlete performs a forward fall, release of the footwear and the binding, the arms 28 being in fact enabled to complete a clockwise rotation with respect to the pivot axis of the element 24 by virtue of the fact that the bar 25 is allowed to further urge the pin 19 and compress the spring 21.

Adjustment of the element 17 through the screw 18 allows determination of the optimum threshold for each athlete, the spring preload, as represented by an appropriately graduated scale, advantageously being displayed through the opening 23.

To effect release of the footwear from the binding the athlete merely has, as shown in Figure 5, to insert the end 43 of the ski pole into a pre-arranged seat 44 formed on the wing 11 of the release element 9, the rotation which is thus imparted to the latter enabling uncoupling of the dog 12 from the seat 13 and hence subsequent smap-action opening of the toe piece 14, the

spring 21 being preloaded.

In the open binding phase, shown in Figure 6, the arms 28 will be moved away from the groove 6, thanks to the presence of the spring 39 which imposes a rotation to the locking element 24.

It has thus been shown that the invention achieves all the objects set forth, enabling a cross-country skiers footwear to be quickly and easily hooked on and released from the binding.

The use of a safety element further allows release for any forward falls of the athlete, the opening of the arms 28 with respect to the groove 6 being permitted even in the event of any sideways rotation imparted to the footwear toe piece always in the fall phase.

The athlete's stride is moreover facilitated by the presence of the elastically rocking element 35.

The invention herein is susceptible to many modifications and changes, all of which would fall within the inventive concept, obviously any materials and dimensions may be used according to demand, and all of the details may be replaced with technically equivalent elements.

CLAIMS

1. A ski binding for cross-country skiing, characterized in that it comprises a plate (2) associable with a ski and having lateral engagement grooves (6) for a pin (29) projecting forwardly of the toe piece (14) of a footwear article (30), with said plate (2) there being associated an elastically oscillable element (35) and there being journalled a locking element (24) for locking said pin (29) in the guides, said element (35) cooperating with an elastically deformable means, adapted to permit disengagement during the phase of opening the locking element from the pin, and with an adjustable safety element (24) associated with a toe piece (14) journalled idly to the plate (2), said toe piece (14) having means of engagement (22) with the plate and with a release element (9) journalled on the plate itself.

2. A ski binding for cross-country skiing as in claim 1, comprising a plate (2) which is characterized in that it has two side shoulders (7), wherebetween there is journalled idly an elastically oscillable element (35) with the rear surface conforming with the end of the toe piece (14) of a footwear article (30), said element (35) having a nib (36) downwardly, insertable into a seat (13) formed on the plate (2) and one or more hooking seats (16) for at least one end of an elastically deformable element (33), the other end of the latter being associated with a forward pin (29), placed between said shoulders (7), whereto a locking element (24) is journalled idly.

3. A ski binding as in claims 1 and 2, comprising a locking element (24) which is characterized in that it comprises two longitudinal side arms (28) journalled on the forward pin (29), between said arms (28) there being made rigid a crossbar (25) cooperating at one end with an adjustable safety element (17), on the opposed side from said arms there projecting at least two more longitudinal side arms (28) having the free ends slightly bent arcuately and adapted to lock, at the grooves (6) formed on the carousel, the projecting pin (29) of the footwear article (30), said bar (25) having downwardly a hooking dog (32) for an elastically deformable element composed of a cylindrical coil spring (33) working by compression and at least partially housed in a pre-arranged seat formed on the plate (2).

4. A ski binding as in claims 1, 2 and 3, comprising an adjustable safety element (17) which is characterized in that it is associated with a toe piece (14), journalled idly between the shoulders (7) of the plate (2), and of being composed of a through-going longitudinal seat, partly threaded inside, accommodating a screw (18) and the end of a pin (19) projecting rearwardly of the toe piece (14), said screw (18) and pin (19) having one pre-arranged seat each for interposition therebetween of an elastically deformable element composed of a cylindrical coil spring (21) working by compression.

5. A ski binding as in claims 1 and 4, comprising a release element which is characterized in that it is

composed of a nib (36), of essentially U-like shape, journalled idly, at the longer flat wing (10), between two longitudinal arms projecting forwardly of the plate (2), the other wing (11) of said nib (36) having a tooth (12) engaging in a seat (13) formed at the forward end of the toe piece (14), said longer wing (10) abutting, on closing the binding, on said plate (2).

6. A ski binding as in claims 1, 3 and 4, comprising an adjustable safety element (17) the pin (19) wnereof, projecting from the toe piece (14), is characterized in that it cooperates, at the free end, with the crossbar (25) of the locking element (24).

7. A ski binding as in claims 1 and 4, comprising a toe piece (14) which is characterized in that it is journalled idly at the rear end to a pin (19) lying on a plane, perpendicular to the plate (2), placed between the parallel planes of lay of the pins of the oscillable element (35) and the locking element (24).

8. A ski binding as in claims 1 and 4, comprising a toe piece (14) which is characterized in that it has an upper opening (23) communicating with the seat for the adjustable safety element (17).

9. A ski binding as in claims 1, 4 and 5, comprising a toe piece (14) which is characterized in that it has downwardly means of engagement (22) with the plate (2) composed of two longitudinal seats conforming with the longitudinal arms (8) projecting forwardly of the plate (2).

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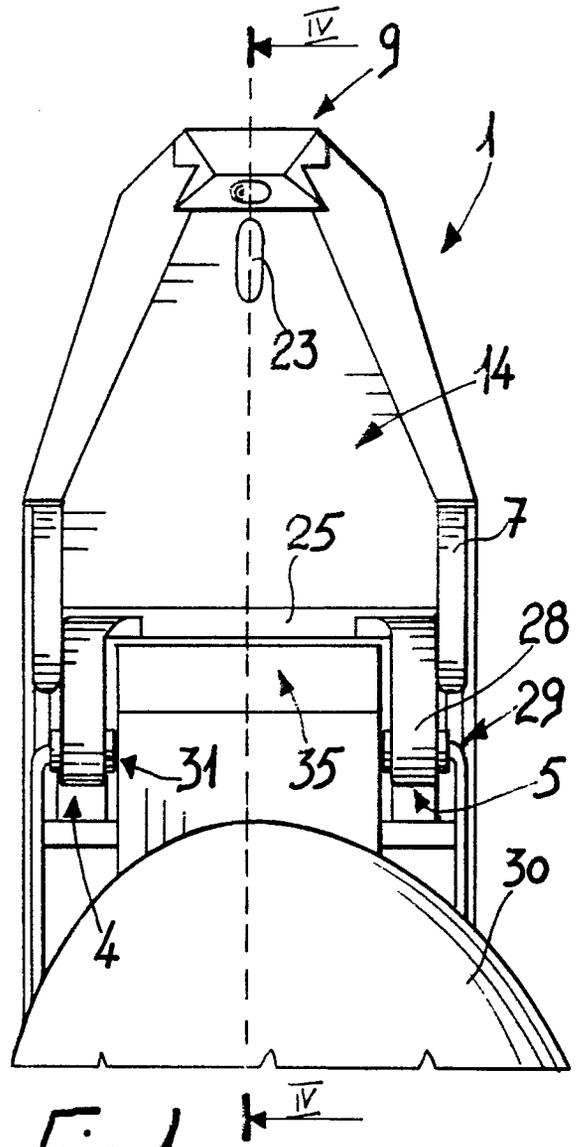

Fig.1

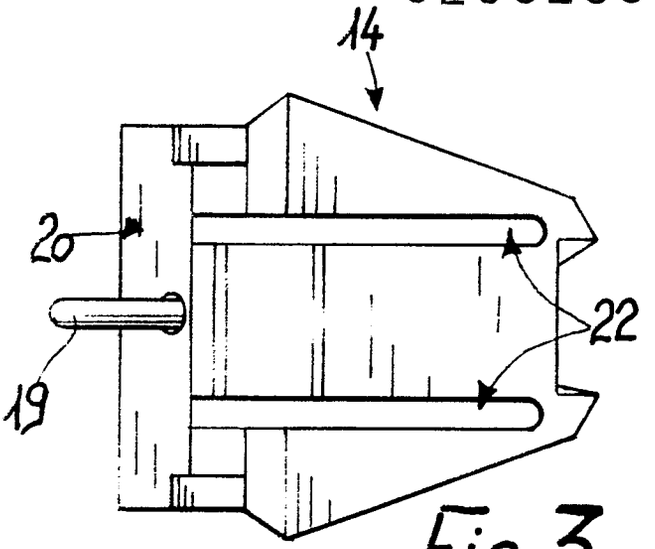

Fig.3

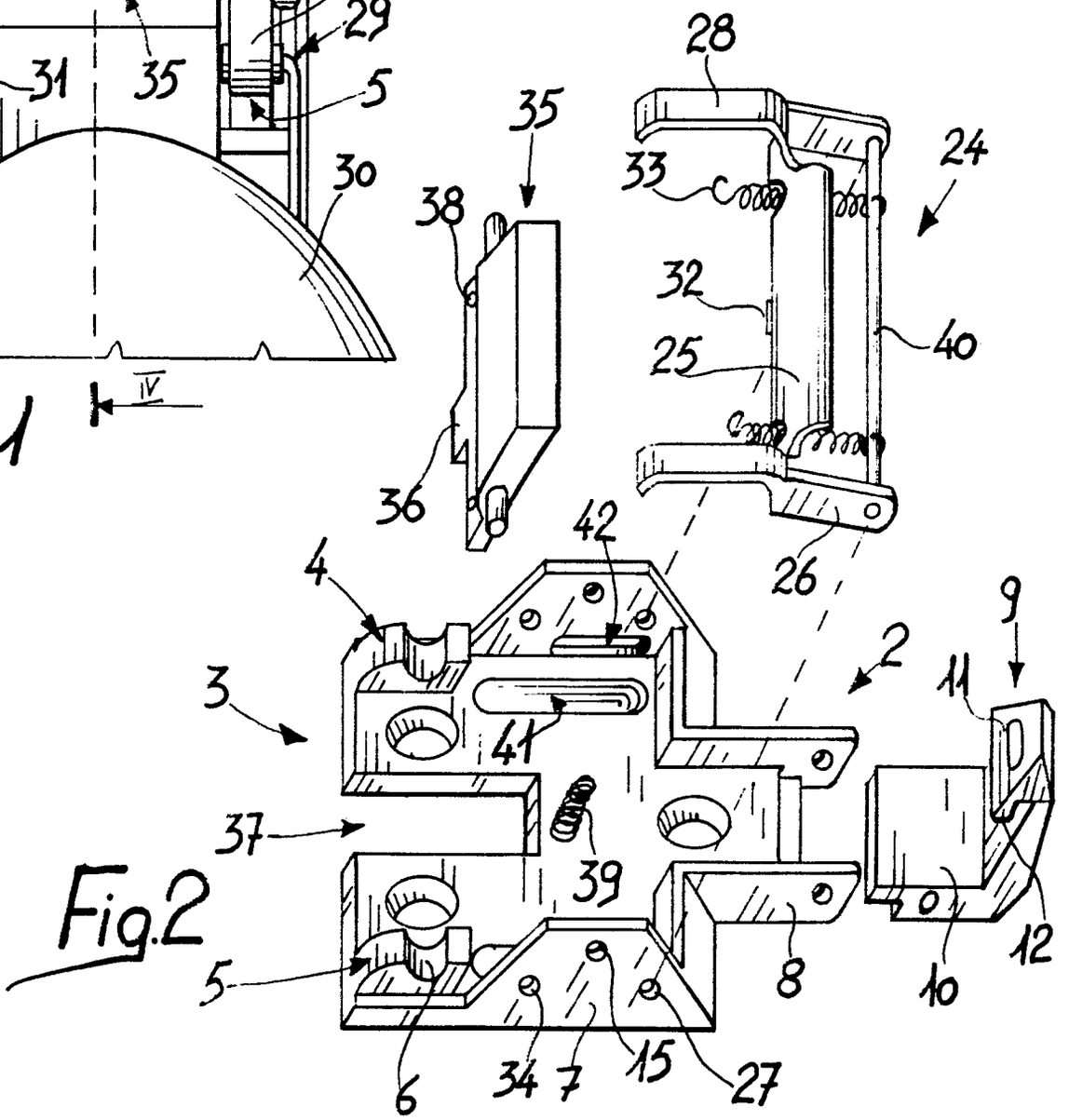

Fig.2

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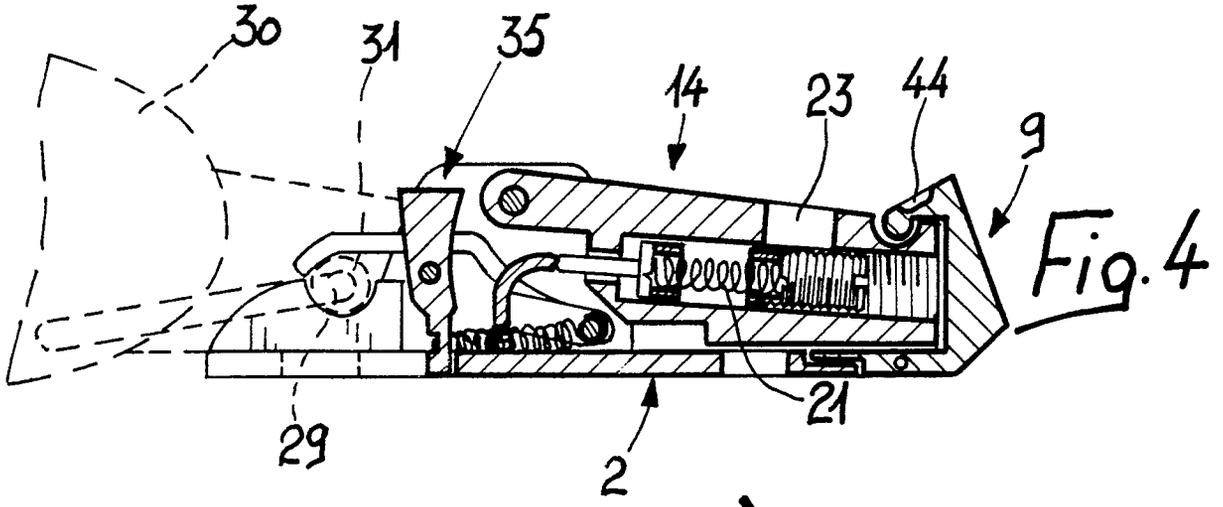
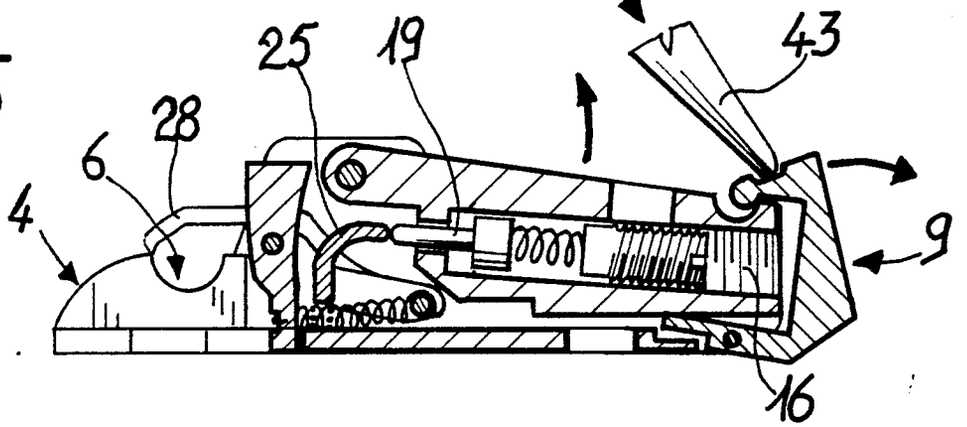


Fig.4

Fig.5



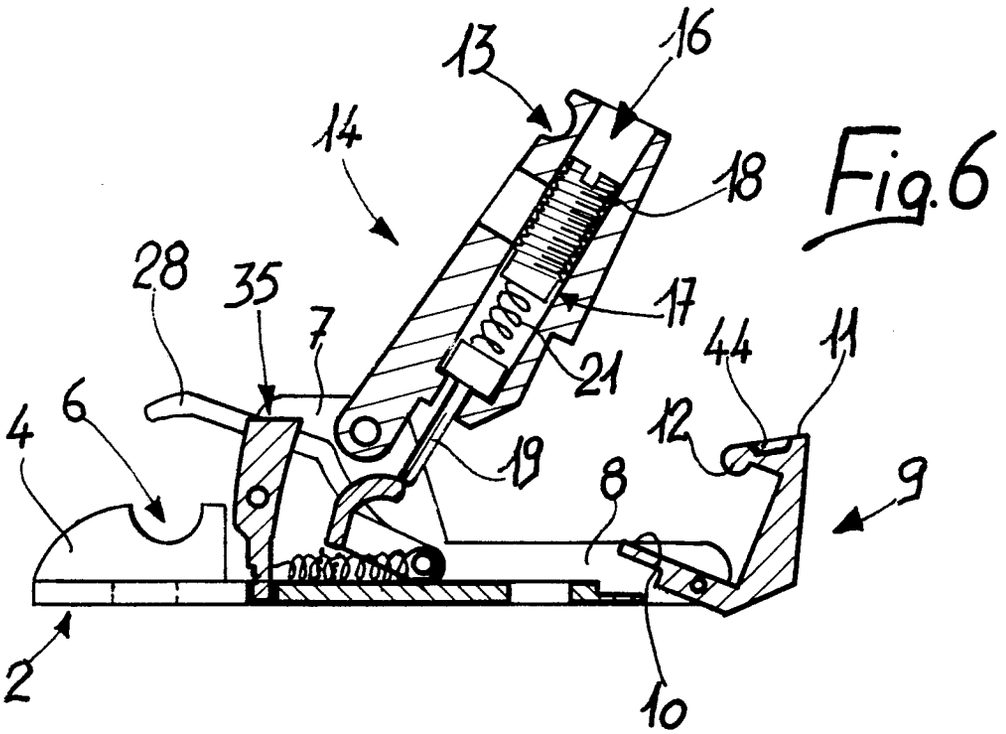


Fig.6