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(54) Method for producing moving contacts of the tilting type for electrical circuit breakers

(57) A method for producing a moving contact of the tilting type for circuit breakers (2) or the like, comprising a step of feeding a laminar body (10) to a blanking and bending device (9) which is adapted to provide at least one moving contact of the tilting type (1) which extends along a longitudinal direction (100) and has a first contact portion which is adapted to oscillate on a first fixed contact supported by a circuit breaker (5) and at least one second moving contact portion (6) which is designed to face a respective second fixed contact (7) supported by the circuit breaker (5), there being a step of arranging, on the laminar body (10) fed to the blanking and bending device (9), a first element (11) made of electrically conducting filler material and at least one second element (12) made of electrically conducting filler material, the blanking and bending device (9) providing, simultaneously with the blanking and bending of the laminar body (10) in order to obtain the moving contact of the tilting type (1), the spreading of the first element (11) in order to provide the first contact portion (3) and the coining of the second element (12) in order to provide a respective second moving contact portion (6).

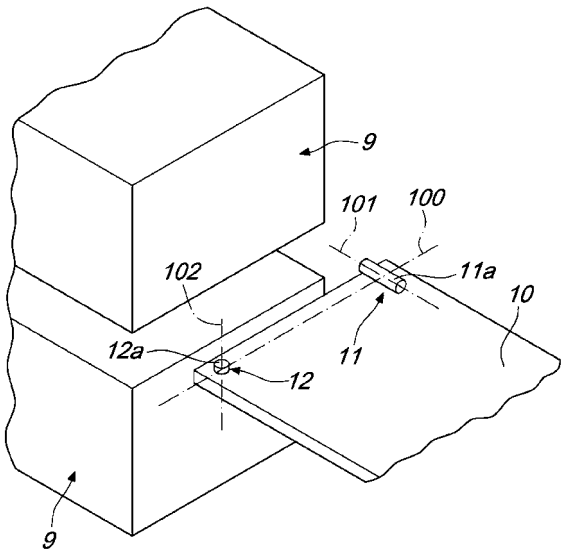

Fig. 13

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Description

[0001] The present invention relates to a method for producing moving contacts of the tilting type for electrical circuit breakers as well as the moving contacts of the tilting type made using the aforementioned method.

[0002] Circuit breakers or the like (diverters, switches etc.) are known which comprise a first fixed contact and at least one second fixed contact which are electrically connected respectively to a first and to a second electrical pole.

[0003] Such circuit breakers have, moreover, a moving contact, typically of the tilting type, which has a first contact portion adapted to oscillate on the first fixed contact and at least one second moving contact portion facing a respective second fixed contact.

[0004] The moving contact can be moved, after user intervention, on a command body by means of angular oscillation about the first fixed contact between an open condition, in which the second moving contact portion is spaced from the respective second fixed contact, and at least one closed condition in which the second moving contact portion is kept pressed against the respective second fixed contact so as to establish an electrical connection between the first fixed contact and the second fixed contact.

[0005] As described above, the first contact portion defined on the moving contact is made in such a way as to be able to oscillate on the first fixed contact. In order to obtain such result, a first coupling region with a rounded profile is provided on the first fixed contact or, alternatively, on the first contact portion; the first coupling region with a rounded profile is intended to be accommodated in a second, cradle-like coupling region defined on the first contact portion or, alternatively, on the first coupling region.

[0006] An extremely important characteristic of circuit breakers of the type described above is linked to the quality of the electrical contact between the first contact portion defined on the moving contact and the first fixed contact, since it is this area, which is subject to electrical discharges and mutual scraping, that sees temperature increases and voltage arcs which are potentially capable of compromising the good operation of the circuit breaker.

[0007] One of the solutions adopted nowadays in order to make the electrical contact between the first contact portion defined on the moving contact and the first fixed contact reliable is the application of layers of covering made of silver at the first coupling region with a rounded profile and at the second, cradle-like coupling region.

[0008] As is known, the presence of the silver increases electrical conductivity between the first fixed contact and the moving contact, and it reduces heating due to the ohmic effect and the creation of sparks between the mutually sliding parts.

[0009] It has however been found that the solution described above is extremely expensive and also that it is complex in terms of production.

[0010] Moreover, it has been found that in many cases the layers of covering made of silver can deteriorate as a result of the frequent oscillations between the first coupling region with a rounded profile and the second, cradle-like coupling region.

[0011] Circuit breakers are likewise known in which the first fixed contact and the moving contact are made of copper or of brass and are covered with silver.

[0012] Such solution, although widely used, has drawbacks which are similar to the previous one, and also there is the necessity of introducing an additional step into the production cycle in order to perform the covering, with evident increase in plant cost and in production times.

[0013] The aim of the present invention is to provide a method for producing moving contacts of the tilting type for electrical circuit breakers as well as the moving contacts of the tilting type which are made using the aforementioned method and are capable of eliminating the above-mentioned drawbacks.

[0014] Within this aim, an object of the present invention is to provide a method that makes it possible to obtain moving contacts of the tilting type which are extremely reliable without introducing additional manufacturing steps.

[0015] Another object of the invention is to provide a method that makes it possible to recover production discards.

[0016] Another object of the present invention is to devise a method that makes it possible to obtain moving contacts of the tilting type which has extremely competitive production costs, so that its use is advantageous from the economic viewpoint as well.

[0017] This aim and these and other objects which will become more apparent hereinafter are achieved by a method for producing moving contacts of the tilting type according to claim 1.

[0018] Further characteristics and advantages of the invention will become more apparent from the description of some preferred but not exclusive embodiments of a method for producing moving contacts of the tilting type, which are illustrated by way of non-limiting example in the accompanying drawings wherein:

Figure 1 is a perspective view of a first embodiment of a moving contact of the tilting type, obtained by way of a method according to the present invention;

Figure 2 is a partially sectional perspective view of a rotary circuit breaker, in which the outer enclosure is not shown for greater clarity, provided with moving contacts shown in Figure 1 with the moving contacts in the open condition;

Figure 3 is a side view of the circuit breaker shown in Figure 2 with the moving contact of the tilting type in the open condition;

Figure 4 is a view similar to the previous figure in which the moving contact of the tilting type is in the

closed condition;

Figure 5 is a perspective view of a second embodiment of a moving contact of the tilting type, obtained by way of a method according to the present invention;

Figure 6 is a partially sectional perspective view of a rotary circuit breaker, in which the outer enclosure is not shown for greater clarity, provided with moving contacts shown in Figure 5 with the moving contacts in the open condition;

Figure 7 is a side view of the circuit breaker shown in Figure 6 with the moving contact of the tilting type in the open condition;

Figure 8 is a view similar to the previous figure in which the moving contact of the tilting type is in the closed condition;

Figure 9 is a perspective view of a third embodiment of a moving contact of the tilting type, obtained by way of a method according to the present invention;

Figure 10 is a partially sectional perspective view of a rotary circuit breaker, in which the outer enclosure is not shown for greater clarity, provided with moving contacts shown in Figure 9 with the moving contacts in the open condition;

Figure 11 is a side view of the circuit breaker shown in Figure 10 with the moving contact of the tilting type in the open condition;

Figure 12 is a view similar to the previous figure in which the moving contact of the tilting type is in the closed condition; and

Figure 13 is a schematic perspective view of the step of feeding a laminar body into a blanking and bending device.

[0019] In the embodiments that follow, individual characteristics shown in relation to specific examples may in reality be interchanged with other, different characteristics, existing in other embodiments.

[0020] Moreover, it should be noted that anything found to be already known during the patenting process is understood not to be claimed and to be the subject of a disclaimer.

[0021] With reference to the figures mentioned above, the present invention relates to a method for producing a moving contact of the tilting type 1 for circuit breakers 2, for switches, for selectors or the like.

[0022] The method comprises, as is known, a step of feeding a laminar body, designated with the reference numeral 10, to a blanking and bending device 9 which is adapted to provide at least one moving contact of the tilting type 1 which extends along a longitudinal direction 100.

[0023] The moving contact 1 has a first contact portion 3 which is adapted to oscillate on a first fixed contact 4 which is supported by a circuit breaker 2 and at least one second moving contact portion 6 which is designed to face a respective second fixed contact 7 supported by the circuit breaker 2.

[0024] The method according to the invention comprises a step of arranging, on the laminar body 10 fed into the blanking and bending device 9, a first element 11 made of an electrically conducting filler material and at least one second element 12 made of an electrically conducting filler material.

[0025] In particular, the blanking and bending device 9 provides, simultaneously with the blanking and bending of of the laminar body 10 in order to obtain the moving contact of the tilting type 1, the spreading of the first element 11 so as to provide the first contact portion 3 and the coining of the second element or elements 12 in order to provide a corresponding second moving contact portion 6.

[0026] According to a practical embodiment of the method according to the invention, the first element 11 is constituted by a first wire portion 11a made of an electrically conducting filler material which has a direction of extension 101 that faces the plane of arrangement of the laminar body 10 and is arranged transversely with respect to the longitudinal direction 100, and the second element 12 comprises a respective second wire portion 12a made of an electrically conducting filler material which has a direction of extension 102 that is perpendicular to the plane of arrangement of the laminar body 10.

[0027] The laminar body 10, and consequently the moving contacts of the tilting type obtained therefrom, are substantially made of brass.

[0028] Advantageously, the first wire portion and/or the second wire portion (11a, 12a) are substantially made of silver.

[0029] With reference to the embodiments shown in Figures 1 to 4 and Figures 5 to 8, the blanking and bending device is adapted to provide the first contact portion 3 which has a cradle-like coupling region 13.

[0030] Alternatively, as in the embodiment shown in Figures 9 to 12, the blanking and bending device is adapted to provide the first contact portion 3 which has a coupling region with a rounded profile 14.

[0031] It is possible for the first wire portion 11a and the second wire portion 12a to have a diameter comprised between 0.5 mm and 2 mm.

[0032] Conveniently, the first contact portion 3 has a thickness comprised between 0.5 mm and 2 mm.

[0033] Obviously nothing forbids having different thicknesses depending on the extent of the current.

[0034] The present invention relates, moreover, to a moving contact of the tilting type for circuit breakers 2, selectors, switches and the like, made using a method according to what is described above.

[0035] In practice it has been found that in all the embodiments the invention has achieved the set aim and objects.

[0036] In practice the materials employed, as well as the contingent shapes and dimensions, may be any according to requirements.

[0037] Moreover, all the details may be substituted by other, technically equivalent elements.

[0038] The disclosures in Italian Patent Application No. VR2011A000141 from which this application claims priority are incorporated herein by reference.

[0039] Where the technical features mentioned in any claim are followed by reference numerals and/or signs, those reference numerals and/or signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference numerals and/or signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference numerals and/or signs.

Claims

1. A method for producing a moving contact of the tilting type for circuit breakers (2) or the like, comprising a step of feeding a laminar body (10) to a blanking and bending device (9) which is adapted to provide at least one moving contact of the tilting type (1) which extends along a longitudinal direction (100) and has a first contact portion (3) which is adapted to oscillate on a first fixed contact (4) supported by a circuit breaker (2) and at least one second moving contact portion (6) which is designed to face a respective second fixed contact (7) supported by said circuit breaker (2), **characterized in that** it comprises a step of arranging, on said laminar body (10) fed to said blanking and bending device (9), a first element (11) made of electrically conducting filler material and at least one second element (12) made of electrically conducting filler material, said blanking and bending device (9) providing, simultaneously with the blanking and bending of said laminar body (10) in order to obtain said moving contact of the tilting type (1), the spreading of said first element (11) in order to provide said first contact portion (3) and the coining of said at least one second element (12) in order to provide a respective second moving contact portion (6).

2. The method according to claim 1, **characterized in that** said first element (11) comprises a first wire portion (11a) which has a direction of extension (101) that faces the plane of arrangement of said laminar body (10) and is arranged transversely to said longitudinal direction (100), and said at least one second element (12) comprises a respective second wire portion (12a) made of electrically conducting filler material which has a direction of extension (102) that is perpendicular to the plane of arrangement of said laminar body (10).

3. The method according to claim 1, **characterized in that** said laminar body (10) is substantially made of brass.

4. The method according to claim 1, **characterized in that** said first wire portion (11a) is substantially made of silver.

5. The method according to claim 1, **characterized in that** said second wire portion (12a) is substantially made of silver.

6. The method according to claim 1, **characterized in that** said blanking and bending device (9) is adapted to provide said first contact portion (3) provided with a cradle-like coupling region.

7. The method according to claim 1, **characterized in that** said blanking and bending device (9) is adapted to provide said first contact portion (3) provided with a coupling region with a rounded profile.

8. The method according to one or more of the preceding claims, **characterized in that** said first wire portion (11a) and said second wire portion (12a) have a diameter comprised between 0.5 mm and 2 mm.

9. The method according to claim 1, **characterized in that** said first contact portion (3) has a thickness comprised between 0.5 mm and 2 mm.

10. A moving contact of the oscillating type for circuit breakers (2), selectors, switches and the like, which is produced by means of a process according to any one of claims 1 to 9.

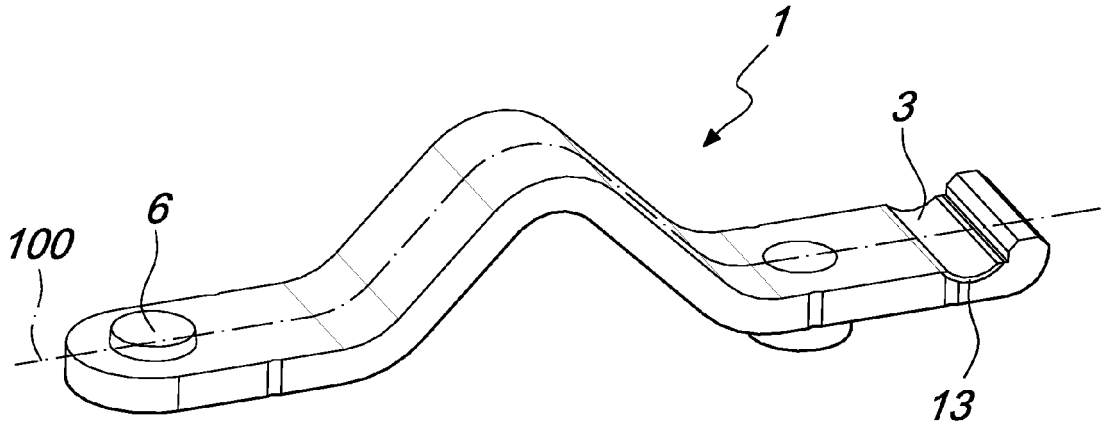

Fig. 1

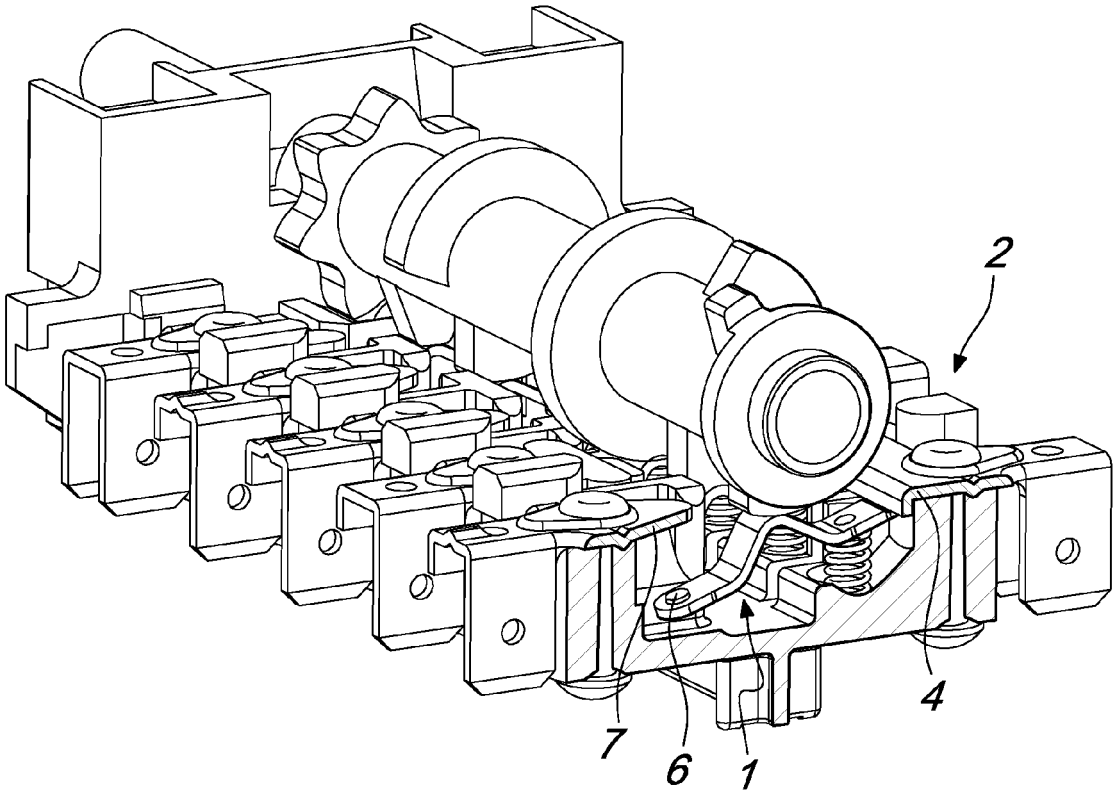

Fig. 2

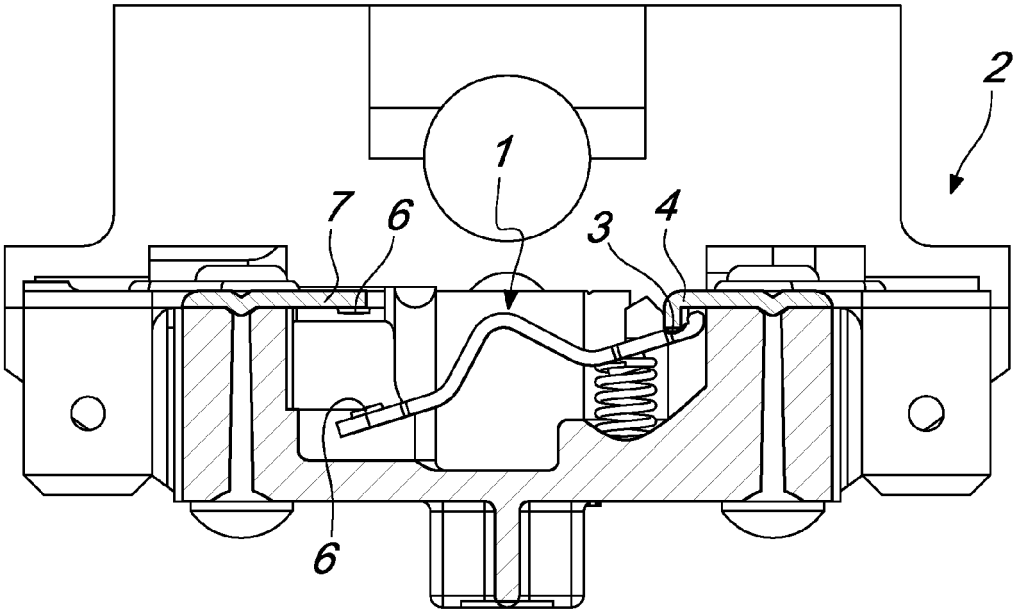

Fig. 3

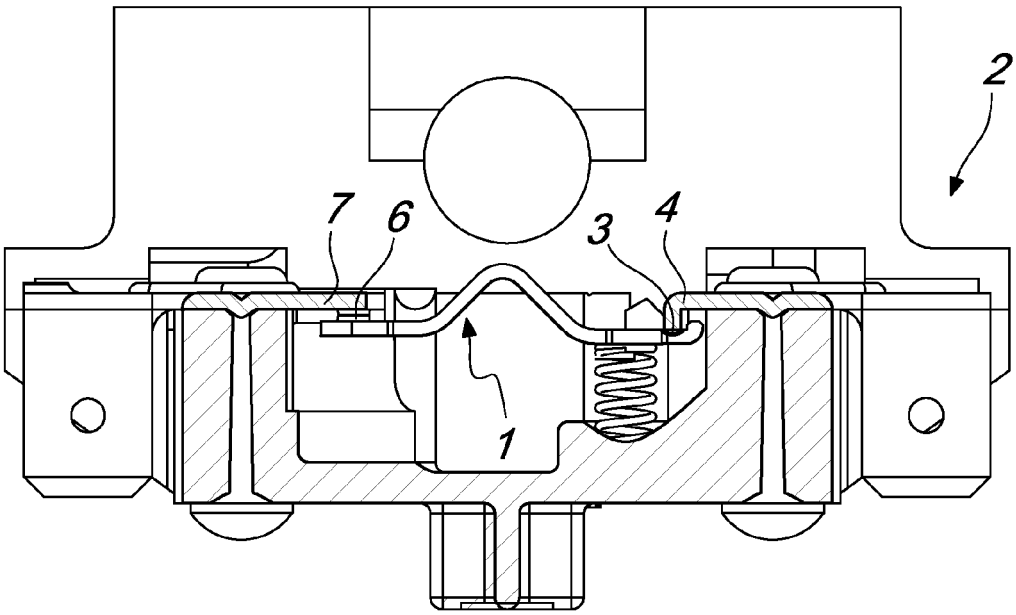

Fig. 4

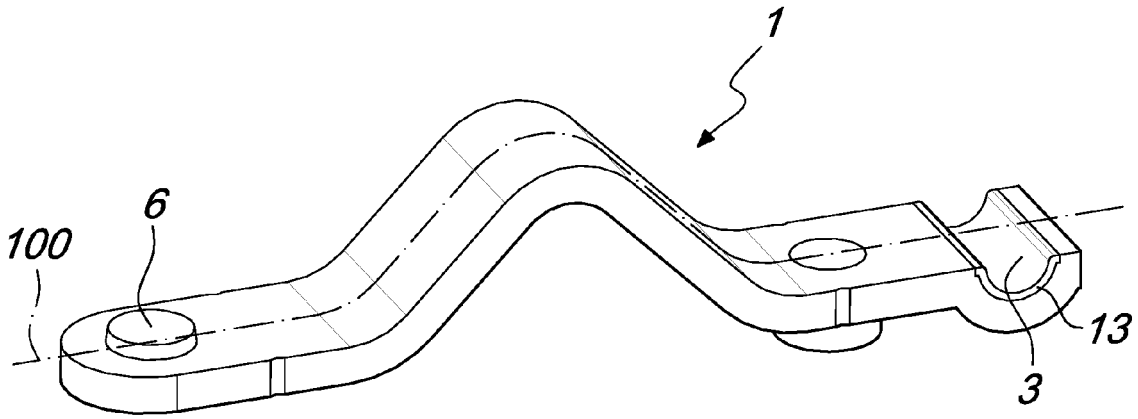

Fig. 5

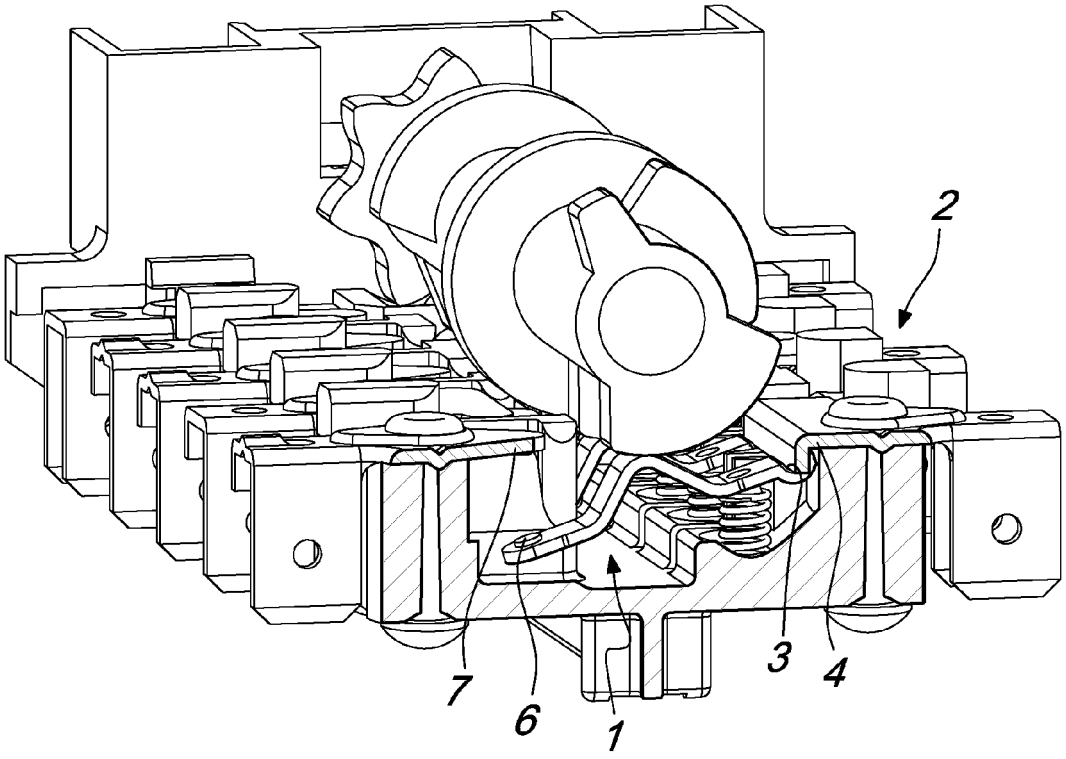

Fig. 6

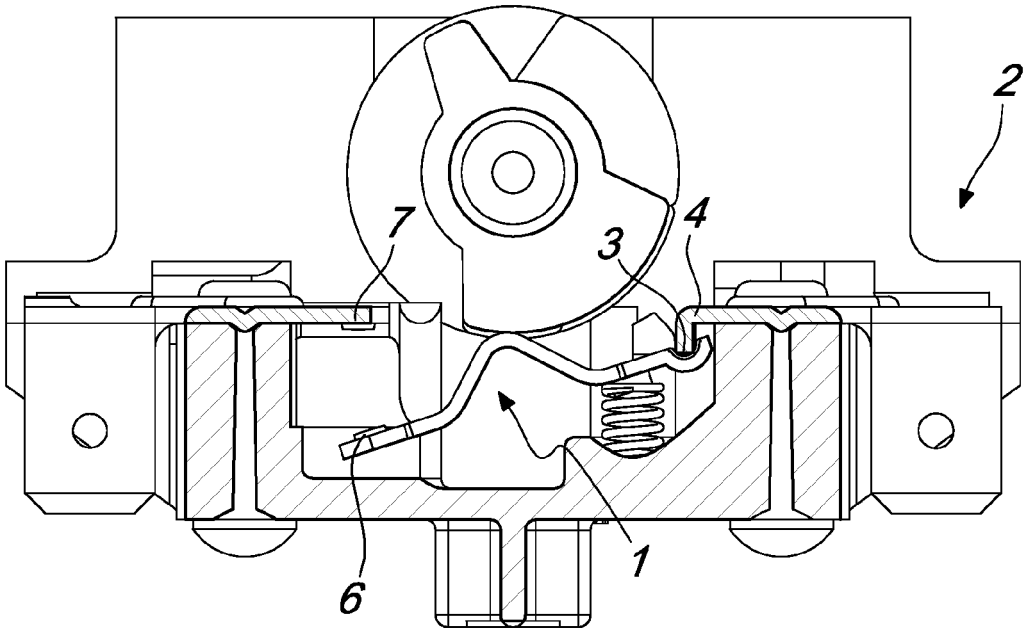

Fig. 7

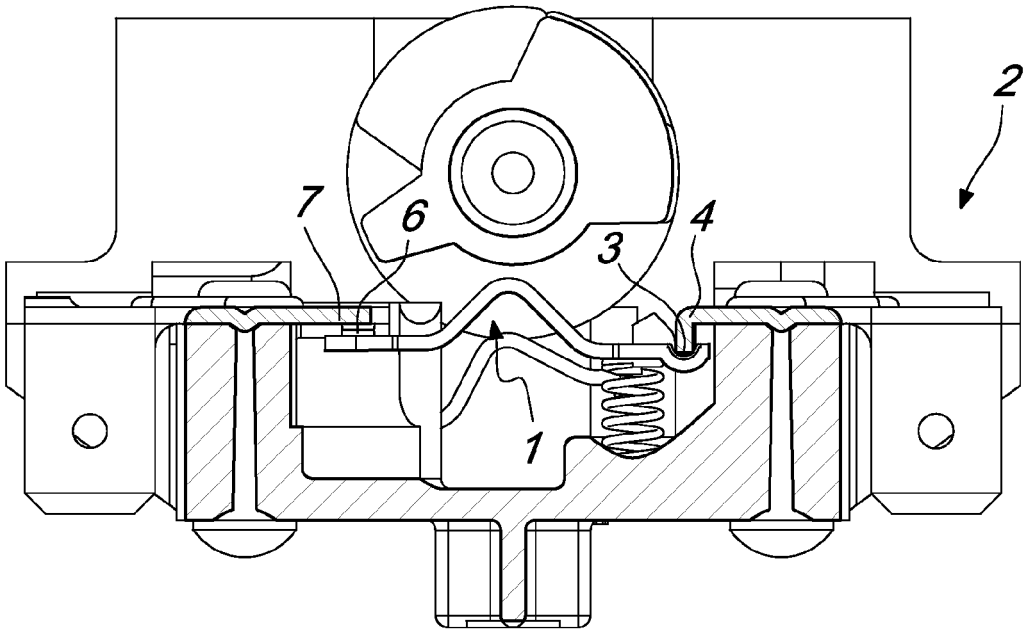

Fig. 8

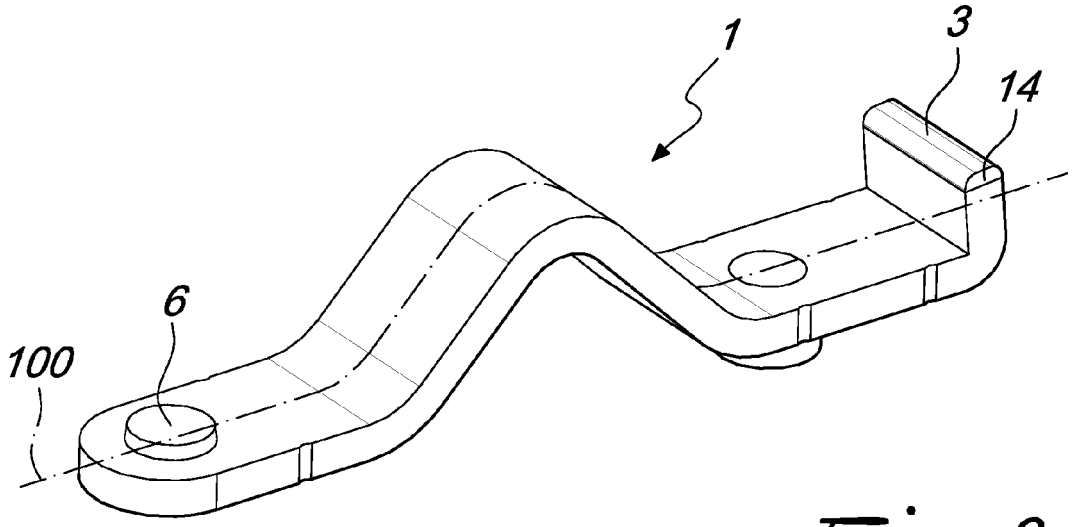

Fig. 9

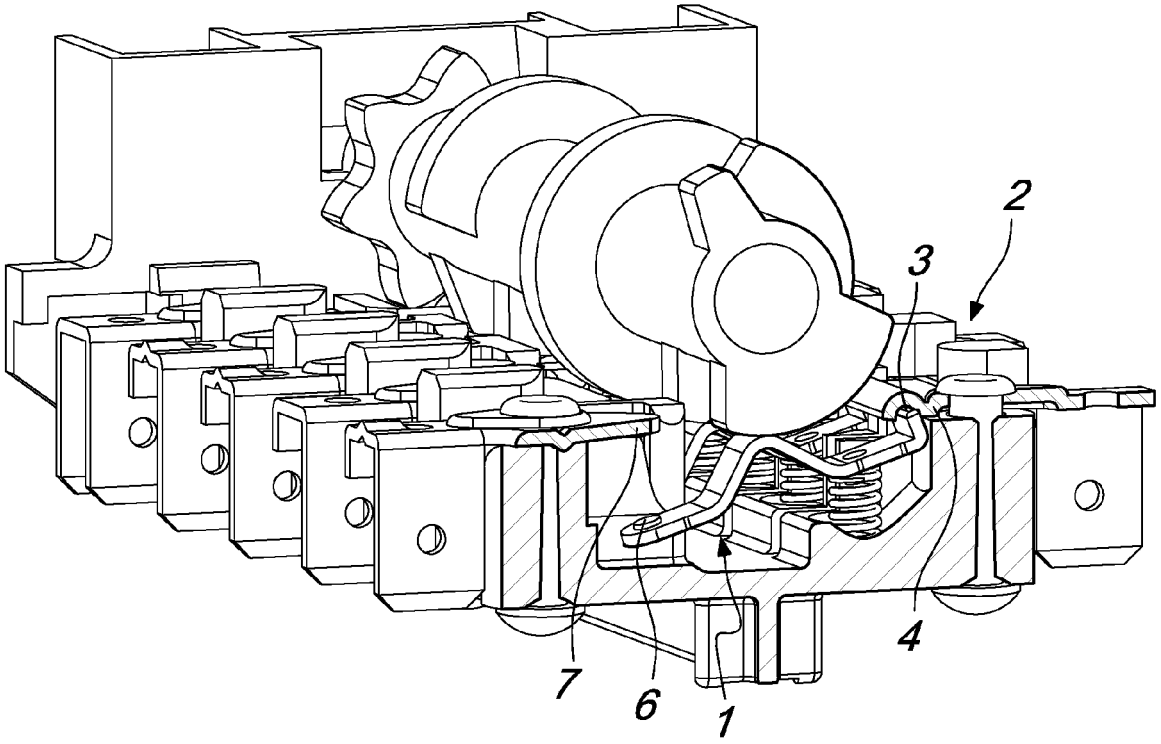

Fig. 10

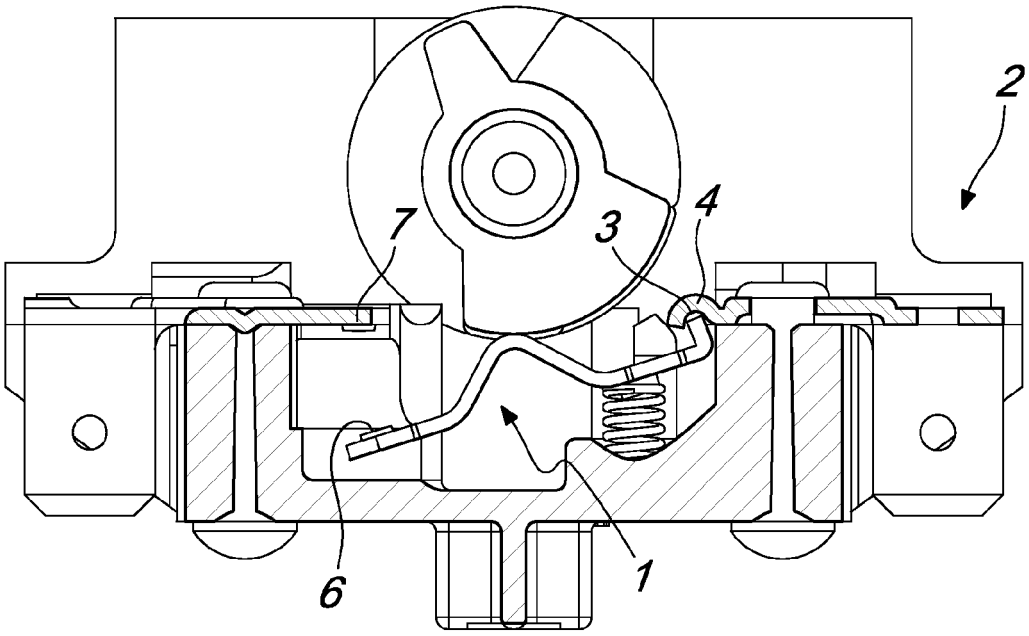

Fig. 11

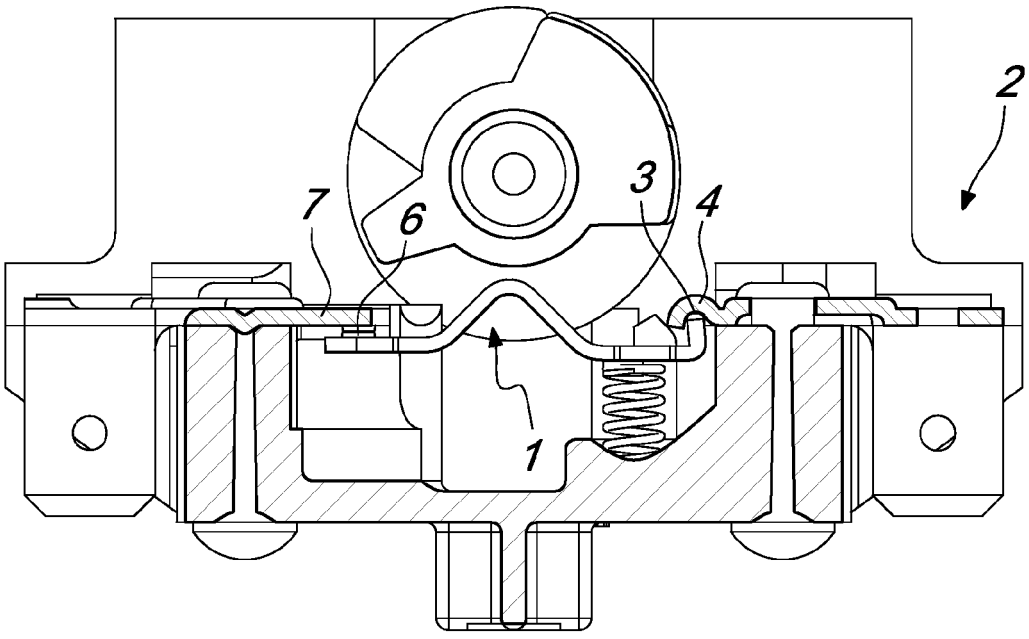

Fig. 12

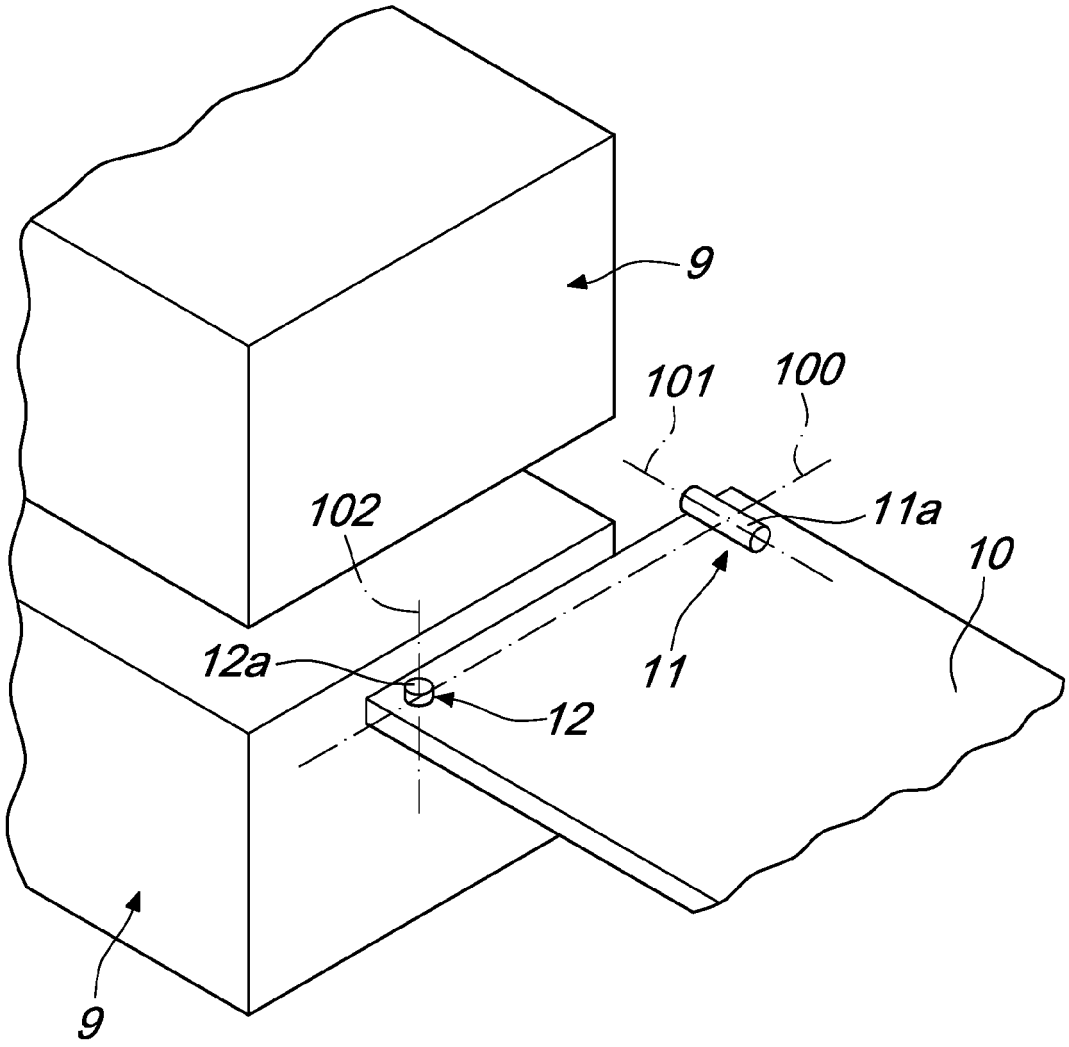

Fig. 13

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EUROPEAN SEARCH REPORT

Application Number
EP 12 17 5569

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A	FR 1 179 488 A (LABINAL ETS) 25 May 1959 (1959-05-25) * figures 1,3 *	1,10	
A	DE 29 22 512 A1 (BIHLER MASCHF OTTO) 4 December 1980 (1980-12-04) * page 8, line 5 - page 9, line 13; figures 1-5 *	1,10	TECHNICAL FIELDS SEARCHED (IPC)
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	24 January 2013	Arenz, Rainer

CATEGORY OF CITED DOCUMENTS

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EUROPEAN SEARCH REPORT

Application Number
EP 12 17 5569

DOCUMENTS CONSIDERED TO BE RELEVANT

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