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**SOLENOID SWITCH FOR THE STARTER OF AN INTERNAL COMBUSTION ENGINE**
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- (56) Prior Art Documents  
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**US 4604597**
- (57) Claim

1. An engaging relay for a starting device-(starter) of an internal combustion engine, having a magnetic core to which a relay coil is assigned and having an armature which has a switching axle which penetrates a through-opening of the magnetic core and on which a bushing is arranged which is mounted in a guide section of the through-opening and which bears a contact bridge, and an anti-rotation element is arranged in the area of the guide between magnetic core and bushing.



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**653596**

(54) Title: SOLENOID SWITCH FOR THE STARTER OF AN INTERNAL COMBUSTION ENGINE

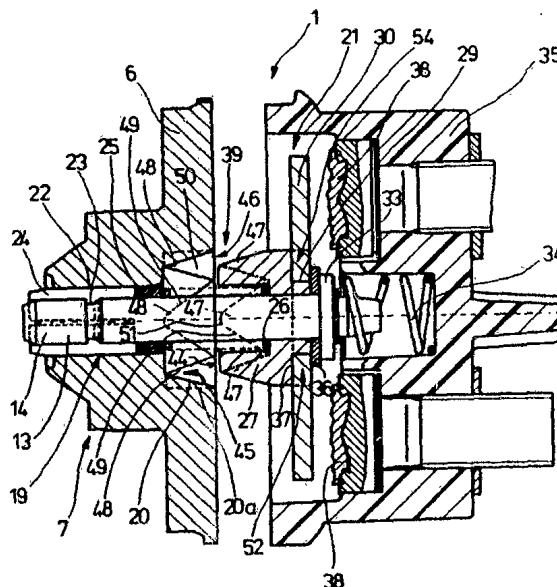
(54) Bezeichnung: EINRÜCKRELAIS FÜR DEN STARTER EINER BRENNKRAFTMASCHINE

(57) Abstract

The invention relates to a solenoid switch for a starter of an internal combustion engine with a magnetic core allocated to a relay coil and an armature having a switching spindle which passes through an aperture in the magnetic core and on which is fitted a bush lying in a guide section of the aperture and bearing a contact bridge. It is distinguished in that a locking device (39) preventing rotation is arranged in the region between the magnetic core (6) and the bush (7).

(57) Zusammenfassung

Die Erfindung betrifft ein Einrückrelais für eine Andrehvorrichtung (Starter) einer Brennkraftmaschine, mit einem Magnetkern, dem eine Relaisspule zugeordnet ist und mit einem Anker, der eine Schaltachse aufweist, die einen Durchbruch des Magnetkerns durchdringt und auf der eine Buchse angeordnet ist, die in einem Führungsabschnitt des Durchbruchs lagert und die eine Kontaktbrücke trägt. Sie zeichnet sich dadurch aus, daß im Bereich der Führung zwischen Magnetkern (6) und Buchse (7) eine Verdrehsicherung (39) angeordnet ist.



**Engaging relay for the starter of an internal  
combustion engine**

**Prior Art**

The invention relates to an engaging relay for a  
5 starter device (starter, in particular pre-engaged drive  
starter) of an internal combustion engine, having a  
magnetic core to which a relay coil is assigned, and  
having an armature which has a switching axle which  
penetrates a through-opening of the magnetic core and on  
10 which a bushing is arranged which is mounted in a guide  
section of the through-opening and which bears a contact  
bridge. (see European Patent Application No. 99998)

Engaging relays of this kind serve the purpose of  
switching a high current with a relatively low control  
15 current. The high current (starter current) which is  
required to start an internal combustion engine by means  
of a starter is for example up to approximately 1000 amps  
in passenger cars and up to 2500 amps in utility  
vehicles. Therefore, the starter switch is sufficient to  
20 switch on the low control current. The high starter  
current is switched by means of the engaging relay.  
However, the engaging relay also has a further function  
since it serves to move the pinion of the starter forward  
for engaging in a ring gear of the internal combustion  
25 engine. The armature of the engaging relay is connected,  
for the purpose of switching the starter current, with a  
contact bridge which connects main current contacts to  
one another in the excited state of the engaging relay.  
In order to bring about a suitable contact pressure for  
30 switching the large starter current, the contact bridge  
is acted on axially by means of a spring arrangement and  
mounted on a switching axle of an armature of the  
engaging relay. The spring arrangement does not engage  
directly on the contact bridge but rather indirectly via  
35 a bushing which holds the contact bridge. During mounting  
and in operation, the known engaging relay has disadvan-  
tages because the assignment of the position of the  
contact bridge to its set position is often not

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maintained with sufficient accuracy.

### Summary of the Invention

The invention provides an engaging relay for a starting device (starter) of an internal combustion engine, having a magnetic core to which a relay coil is assigned and having an armature which has a switching axle which penetrates a through-opening of the magnetic core and on which a bushing is arranged which is mounted in a guide section of the through-opening and which bears a contact bridge, and an anti-rotation element is arranged in the area of the guide between magnetic core and bushing.

### Advantages of the invention

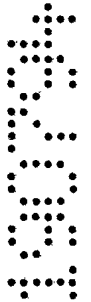
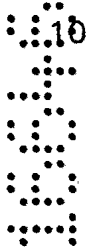
In comparison with the prior-art, the engaging relay according to the invention has the advantage that a play-free and positionally accurate assignment of the contact bridge to its set position is maintained. For this purpose, an anti-rotation element is arranged between the magnetic core and the bushing. In this way, the relative position of the bushing with respect to the magnetic core is always maintained or it is at least always restored when the engaging relay is in the non-excited state, since the bushing then moves deeply into the guide section of the opening. The contact bridge has a fixed rotary-angle assignment with respect to the bushing itself so that a correct alignment of contact bridge with respect to the magnetic core and also to the main current contacts is always ensured.

In accordance with a further embodiment of the invention, there is provision for the anti-rotation element to be formed by a non-circular cross-

section of the outer surface of the bushing, and for the guide section of the through-opening to be constructed so as to match the shape of the cross-sectional contour of the outer surface. In particular, the non-circular cross-section can be constructed preferably as a hexagon. In this way, the

5 predetermined rotary-angle position is always maintained between magnetic core and bushing irrespective of the operating state of the engaging relay.

In order to compensate manufacturing tolerances and bearing play, there is preferably provision for the guide section to be of conical construction such that it tapers with increasing depth. This results in the outer surface of the bushing being supported free of play on the guide section in the non-excited state of the engaging relay so that an extremely precise rotary-angle alignment takes place. However, it is also expedient as



an additional or alternative feature for the outer surface of the bushing to be of corresponding conical construction such that its cross-section increases in the direction of the contact bridge. This has the advantage  
5 of an increased guide and support surface.

In accordance with a further development of the invention, there is provision for the anti-rotation element to be formed by a non-plane end face of the bushing, the end face interacting with a correspondingly  
10 shaped head face of the guide section. In the non-excited state of the engaging relay, the end face of the bushing moves onto the head face of the guide section so that an accurately angled alignment of the two parts takes place. The head face is preferably constructed as an annular  
15 shoulder of the through-opening, the guide section having, for the purpose of receiving the bushing, a larger diameter than the rest of the through-opening.

In order to form the non-plane end face, teeth which engage in corresponding depressions on the head  
20 face can be constructed on the said end face.

Preferably, the teeth are arranged in a circular shape on the end face.

In accordance with a further development, there is provision for the teeth to have obliquely extending  
25 edges such that they widen in the direction of the bases of the teeth and taper in the direction of the tops of the teeth, respectively. The depressions on the head face are of corresponding construction so that when the teeth engage in the corresponding depressions a play-free and  
30 exact alignment between bushing and magnetic core takes place.

By virtue of the construction of the teeth, the bushing is given a crown-shaped appearance.

Preferably, there is provision for the bushing,  
35 and thus the contact bridges, to be capable of being mounted in different rotary-angle positions by rotating by at least one tooth division with respect to the magnetic core. By virtue of this measure, a corresponding angular assignment between contact bridge and magnetic

core can thus be carried out during mounting of the engaging relay in order, for example, to be able to allow for particular construction features of an engine compartment of a motor vehicle.

5           As already mentioned, the contact bridge is attached on the bushing in a rotationally locked manner. This rotationally locked bearing is preferably achieved by means of a nose/recess connection between the afore-said parts.

10           In accordance with a preferred exemplary embodiment, the bushing has a collar which has a smaller diameter and engages through a hole on the contact bridge. The nose/recess connection can be constructed on the collar or on the hole, the collar preferably having  
15 a nose which extends radially and the hole being provided with a corresponding recess into which the nose engages. However, it is also possible as an additional or alternative feature for the collar to adjoin an annular face of the bushing which is formed by the smaller diameter of  
20 the collar with respect to the rest of the outer surface of the bushing, at least one nose being formed on the annular face, which nose engages in a corresponding recess on the contact bridge. Preferably, two diametrically opposite noses and corresponding recesses are  
25 provided.

          It is advantageous if the nose tapers in the direction of its free end area. The recess is of corresponding construction so that a play-free assignment of the two parts is possible.

30           In accordance with a further embodiment, there is provision for the angular position between contact bridge and magnetic core to be predetermined depending on the rotary-angle position of the nose/recess connection. This means that for various embodiments of the engaging relay  
35 the position of the nose/recess connection can be varied correspondingly so that correspondingly different rotary-angle positions between contact bridge and magnetic core can be achieved in order to allow for particular constructional features. However, there may also be

provision for a plurality of recesses to be provided for the selection of different rotary-angle positions of the contact bridge so that during mounting the nose is assigned to a selected recess and, to this extent, an individual rotary-angle position is predetermined.

#### Drawing

The invention is explained in greater detail below with reference to the figures, in which:

Figure 1 shows a longitudinal section through an engaging relay of a starter device of an internal combustion engine,

Figure 2 shows a top view of a bushing for a contact bridge of the engaging relay according to Figure 1,

Figure 3 shows the bushing in Figure 2 in a side view,

Figure 4 shows a longitudinal section through an engaging relay in accordance with a different exemplary embodiment, in which case however only the area of a contact chamber is represented,

Figure 5 shows a top view of a bushing for securing a contact bridge in accordance with the exemplary embodiment in Figure 4,

Figures 6 to 9 show the bushing of a further exemplary embodiment in longitudinal section, in top view, in side view and in rear view and

Figures 10 and 11 show a further exemplary embodiment of a polygonal bushing with conical walls.

#### Description of exemplary embodiments

Figure 1 shows a cross-section through an engaging relay 1 which serves to move a pinion forward for engaging in the ring gear of an internal combustion engine (not illustrated) and is simultaneously used to switch a high starter current for the operation of the starter device using a relatively low control current (which is switched on by means of ignition starter switch).

The engaging relay 1 has a relay coil 2 which is



located on a coil holder 3. The coil holder 3 is pushed onto an armature guide tube 4 which engages with its one end over an axial wall 5 of an annular step 7 of a magnetic core 6.

5           The relay coil 2 is covered by a housing 8 which rests with an end section 9, which has a smaller diameter, on the other end of the armature guide tube 4. One spring 10 is supported on the one hand on an inner wall of the end section 9 and on the other hand on the  
10 associated end face of the coil holder 3, as a result of which the coil is forced in the direction of the magnetic core 6 and thus mounted in a vibration-resistant manner.

          An armature 11 which has a (divided) switching axle (14) consisting of the parts 12 and 13 is mounted in  
15 an axially displaceable fashion in the armature guide tube 4, the part 12 being assigned to the armature 11 and the part 13 to the magnetic core 6. The two parts 12 and 13 are at an axial distance a from one another in the non-excited position of the engaging relay 1 (illustrated  
20 in Figure 1).

          At its free end 15, the armature 11 has an actuation extension 16 which, with the intermediate connection of a lever mechanism (not illustrated), serves to move the already mentioned pinion forward.

25           In addition, the armature 11 is provided with an axial recess 17 which faces the magnetic core 6 and into which a helical compression spring 18 engages with one end and is supported there at the base of the recess 17, the other end of the helical compression spring 18  
30 resting on the magnetic core 6. The helical compression spring 18 thus forms a restoring spring for the armature 11.

          The part 13 of the switching axle 14 is mounted in a through-opening 19 of the magnetic core 6. The  
35 through-opening 19 has a guide section 20 which has a larger diameter, faces a contact chamber 21 and has an area 22 which has a smaller diameter and faces the armature 11. The part 13 of the switching axle 14 has an annular groove 23 into which a bearing sleeve 24 engages.

The bearing sleeve 24 is guided in an axially displaceable fashion with its outer surface in the area 22 of the through-opening 19. In this arrangement, a contact spring 26 is supported with one end on the upper section 25 of the bearing sleeve 24 and with its other end on a bushing 27, the bushing 27 being mounted in an axially displaceable fashion in the guide section 20 of the through-opening 19. The contact spring 26 engages in a blind hole 28 of the bushing 27, the said spring 26 being supported on the base of the blind hole 28.

The bushing 27 is provided with a collar 29 which has a smaller diameter and onto which a contact bridge 30 is fitted. The collar 29 engages through a hole 31 of the contact bridge, means being provided which bring about a rotationally locked securing between bushing 27 and contact bridge 30.

In the area of its free end 32, located within the contact chamber 21, the part 13 of the switching axle 14 has a stop collar 33 on which a compression spring 34 is supported with its one free end, its other free end resting on the inside of a cover 35 of a housing. In the interior of the cover 35 of the housing, the already mentioned contact chamber 21 is constructed.

On the other side of the stop collar 33, a plate 36 made of insulating material rests, the said plate 36 having a larger diameter than the collar 29. Between an annular face 37, adjoining the collar 29, of the bushing 27 and of the plate 36 made of insulating material, the contact bridge 30 is arranged, said contact bridge 30 being clamped in between the aforesaid parts by means of the contact spring 26. In this way, the contact bridge 30 is held on the one hand in a defined, but resilient position on the part 13 of the switching axle 14 and can provide the appropriate contact pressure for switching the main current. The contact bridge 30 interacts to this end with main current contacts 38 which are arranged on the cover 35 of the housing.

According to the invention, an anti-rotation

element 39 is provided between the bushing 27 and the magnetic core 6. This causes the bushing 27 always to maintain its angular position with respect to the magnetic core 6 during the operation of the engaging relay 1 so that the contact bridge 30 which is held rotationally locked on the bushing 27 always maintains the desired position with respect to the main current contacts 38.

In accordance with the exemplary embodiment in Figures 1 to 3, the bushing 27 has, for the purpose of forming the anti-rotation element 39, a non-circular cross-section 40 with respect to its outer surface 41, the guide section 20 of the through-opening 19 being constructed so as to fit the shape of the non-circular cross-section configuration so that the two parts cannot rotate with respect to one another.

Preferably, the non-round cross-section is constructed as a polygon 42, in particular as a hexagon 43.

During the operation of the engaging relay, the following function is effected: if the relay coil 2 of the engaging relay 1 is excited, the armature 11 is drawn into the interior of the relay coil 2, as a result of which the axial distance  $a$  between the two parts 12 and 13 of the two-component switching axle 14 is continuously reduced until the two parts 12 and 13 abut one another axially, as a result of which the armature 11 displaces the part 13 of the switching axle 14 to the right (Figure 1). The part 13 of the switching axle 14 moves the contact bridge 30 with it via the bushing 27, which contact bridge 30 finally makes contact with the main current contacts 38 in order to switch on the main current. The switching path is dimensioned in such a way that the bushing 27 always remains with a part of its cross-section 40 inside the guide section 20, a fixed angular position being maintained between these parts by virtue of the non-circular cross-section 40 and the correspondingly designed cross-section configuration of the guide section 20.

Figures 4 to 9 show further exemplary embodiments

of an engaging relay which corresponds in design to the exemplary embodiment in Figure 1, but which merely has a differently constructed anti-rotation element 39 on the bushing 27, further details will be given below relating  
5 to the said anti-rotation element 39.

The anti-rotation element 39 of the second and third exemplary embodiment is formed by a non-plane end face 44 of the bushing 27 and a correspondingly shaped head face 45 of the guide section 20 of the through-open-  
10 ing 19. The head face 45 is produced by virtue of the guide section 20 which has a larger diameter than the rest 22 of the through-opening 19. To this extent, the head face 45 forms an annular step 46 of the through-opening 19.

15 In particular, the anti-rotation element 39 is formed, as can be seen from Figures 4 to 9, in that axially directed teeth 47 are arranged on the end face 44, which teeth 47 engage in corresponding depres-  
20 sions 48 on the head face 45 when the engaging relay 1 is in the non-excited state. The teeth 47 are preferably arranged in a circular shape on the end face 44, as a result of which the bushing 27 is given a crown-shaped appearance.

The teeth have edges 49 which extend obliquely in  
25 such a way that they widen in the direction of the bases 50 of the teeth and taper in the direction of the tops 51 of the teeth, respectively. A corresponding construction is provided in the case of the depressions 48.

30 In order to obtain the rotationally locked bearing, already mentioned, of the contact bridge 30 on the bushing 27, a nose/recess connection 52 between these parts is provided. This nose/recess connection 52 can be provided on the collar 29 in the form of one or more  
35 noses and on the hole 31 of the contact bridge 30 in the form of one or more corresponding recesses. In the illustrated exemplary embodiment of the figures, there is provision for noses 53 to be provided on the annular face 37 of the bushing 27, which noses 53 engage in

corresponding recesses 54 on the contact bridge. Preferably, two noses 53 which lie diametrically opposite one another are provided. These noses 53 taper in the direction of their free end areas; the recesses 54 are of  
5 corresponding construction so that the bushing 27 holds the contact bridge 30 in a rotationally locked manner.

If a plurality of recesses 54 are provided on the contact bridge 31 [sic], different rotary-angle positions can be produced between contact bridge 30 and bushing 27  
10 depending on which of the recesses 54 the noses 53 engage in. This permits a correspondingly different arrangement of the main current contacts 38 on the housing cover 35 to be provided in order, if appropriate, to be able to allow for special constructional features of an internal  
15 combustion engine or the like.

Correspondingly, it is also possible to provide a desired tooth engagement for the presetting of a rotary-angle position between guide section 20 and bushing 27 during the mounting of the engaging relay;  
20 this is also possible in the case of the exemplary embodiment in Figure 1 in that the hexagon 43 is aligned in correspondingly predetermined rotary-angle position with respect to the guide section 20, the rotary-angle position, once specified during mounting, then being  
25 maintained during the further operation of the engaging relay.

In accordance with the second exemplary embodiment according to Figures 4 and 5, the outer surface of the bushing 27 is of conical construction in the area of  
30 the teeth 47, its cross-section increasing in the direction of the contact bridge 30. Correspondingly, the guide section 20 at the through-opening 19 of the magnetic core 6 is also of conical construction in that it tapers with increasing depth.

35 In contrast, in the third exemplary embodiment according to Figures 6 to 9 the bushing 27 is of cylindrical construction. It engages in a guide section, which is correspondingly of cylindrical construction, of the magnetic core 6, as is indicated in Figure 4 with 20a

using broken lines.

Figures 10 and 11 show two variants of the exemplary embodiment in Figures 1 to 3 since here a conically extending cross-section 40 is provided in the case of the anti-rotation element 39, that is to say the faces of the polygon 42 extend obliquely, a corresponding configuration being provided in the guide section 20. This results in the bushing 27 being mounted free of play in the guide section 20 when the engaging relay is not excited.

A further advantageous variant of an anti-rotation element consists in also providing the hexagon guide, of conical construction, of the guide bushing 27 according to Figure 11 with a toothed contour 47 at the end facing away from the contact plate and designing the guide section at the through-opening of the magnetic core 6 correspondingly.

The claims defining the invention are as follows:

1. An engaging relay for a starting device (starter) of an internal combustion engine, having a magnetic core to which a relay coil is assigned and having an armature which has a switching axle which penetrates a through-  
5 opening of the magnetic core and on which a bushing is arranged which is mounted in a guide section of the through-opening and which bears a contact bridge, and an anti-rotation element is arranged in the area of the guide between magnetic core and bushing.

2. The engaging relay according to Claim 1, wherein the anti-rotation element is formed by a non-circular cross-section of the outer surface of the bushing, and in that the guide section of the through-opening is constructed so as to match the shape of the cross-sectional contour of the outer surface.

3. The engaging relay according to any one of the preceding claims, wherein the cross-section of the outer surface of the bushing is a polygon, in particular a hexagon.

4. The engaging relay according to any one of the preceding claims, wherein the guide section of the magnetic core is of conical construction such that it tapers with increasing depth.

5. The engaging relay according to any one of the preceding claims, wherein the outer surface of the bushing is of conical construction such that its cross-section increases in the direction of the contact bridge.

6. The engaging relay according to any one of the preceding claims, wherein the anti-rotation element is formed by a non-plane end face of

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the bushing at the end facing away from the contact bridge, the end face interacting with a correspondingly shaped head face of the guide section.

7. The engaging relay according to Claim 6, wherein the head face is constructed as an annular shoulder of the through-opening, the guide section having a larger diameter than the rest of the through-opening.

8. The engaging relay according to any one of Claims 6 or 7, wherein teeth which engage in corresponding depressions on the head face are constructed on the end face.

9. The engaging relay according to Claim 8, wherein said teeth are arranged in a circular shape on the end face.

10. The engaging relay according to any one of Claims 8 or 9, wherein the teeth have obliquely extending edges such that they widen in the direction of the bases of the teeth and taper in the direction of the tops of the teeth, respectively.

11. The engaging relay according to any one of Claims 8 to 10, wherein, by virtue of the construction of the teeth, the bushing has a crown-shaped appearance.

12. The engaging relay according to any one of the preceding claims, wherein the bushing, and thus the contact bridge, can be mounted in different rotary-angle positions by rotating by at least one tooth division with respect to the magnetic core.

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13. The engaging relay according to any one of the preceding claims, wherein the contact bridge is attached on the bushing in a rotationally locked manner by means of a nose/recess connection.

5 14. The engaging relay according to Claim 13, wherein the bushing has a collar which has a smaller diameter and engages through a hole of the <sup>contact bridge</sup> ~~bushing~~, the annular face having at least one nose, and in that a corresponding recess is constructed on the contact bridge.

10 15. The engaging relay according to any one of the preceding Claims 13 to 14, wherein the angular position between contact bridge and magnetic core is predetermined depending on the rotary-angle position of the nose/recess connection.

15 16. The engaging relay according to any one of the preceding Claims 13 to 15, wherein a plurality of recesses for the selection of different rotary-angle positions of the contact bridge with respect to the magnetic core.

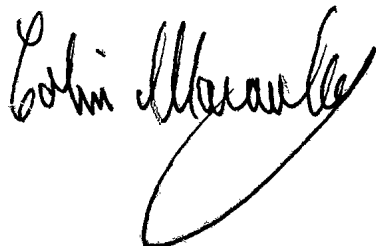
20 17. An engaging relay substantially as hereinbefore described with reference to the accompanying drawings.

D A T E D this 18th day of July, 1994.

ROBERT BOSCH GMBH

By their Patent Attorneys:

CALLINAN LAWRIE



20



**Abstract**

The invention relates to an engaging relay for a starter device (starter) of an internal combustion engine, having a magnetic core to which a relay coil is assigned, and having an armature which has a switching axle which penetrates a through-opening of the magnetic core and on which a bushing is arranged which is mounted in a guide section of the through-opening and which bears a contact bridge. The said invention is characterized in that an anti-rotation element (39) is arranged in the area of the guide between magnetic core (6) and bushing (27).

(Figure 4)

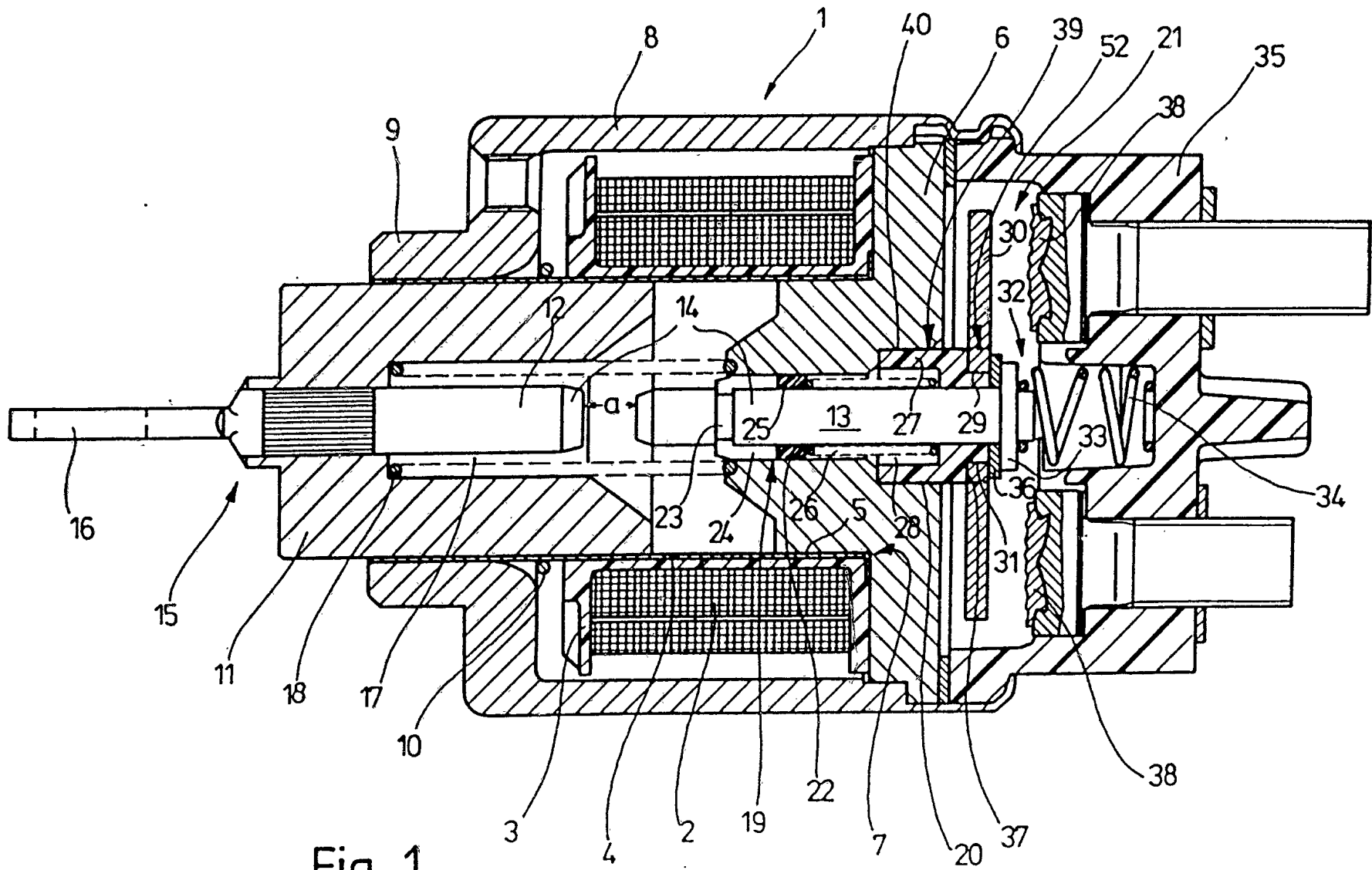


Fig. 1

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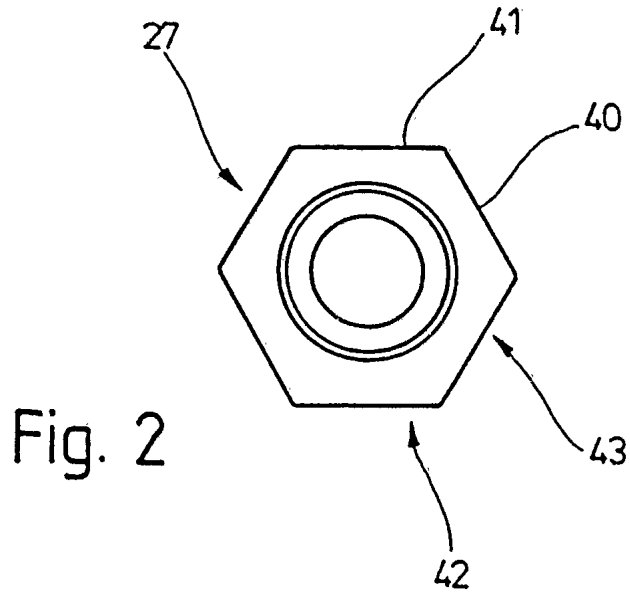


Fig. 2

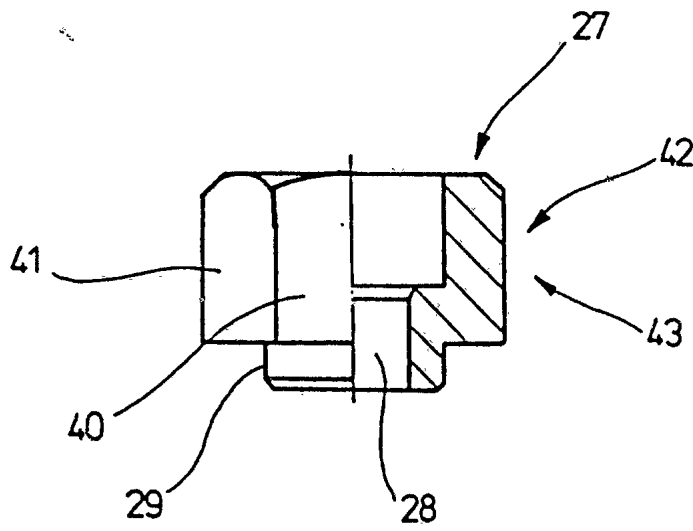
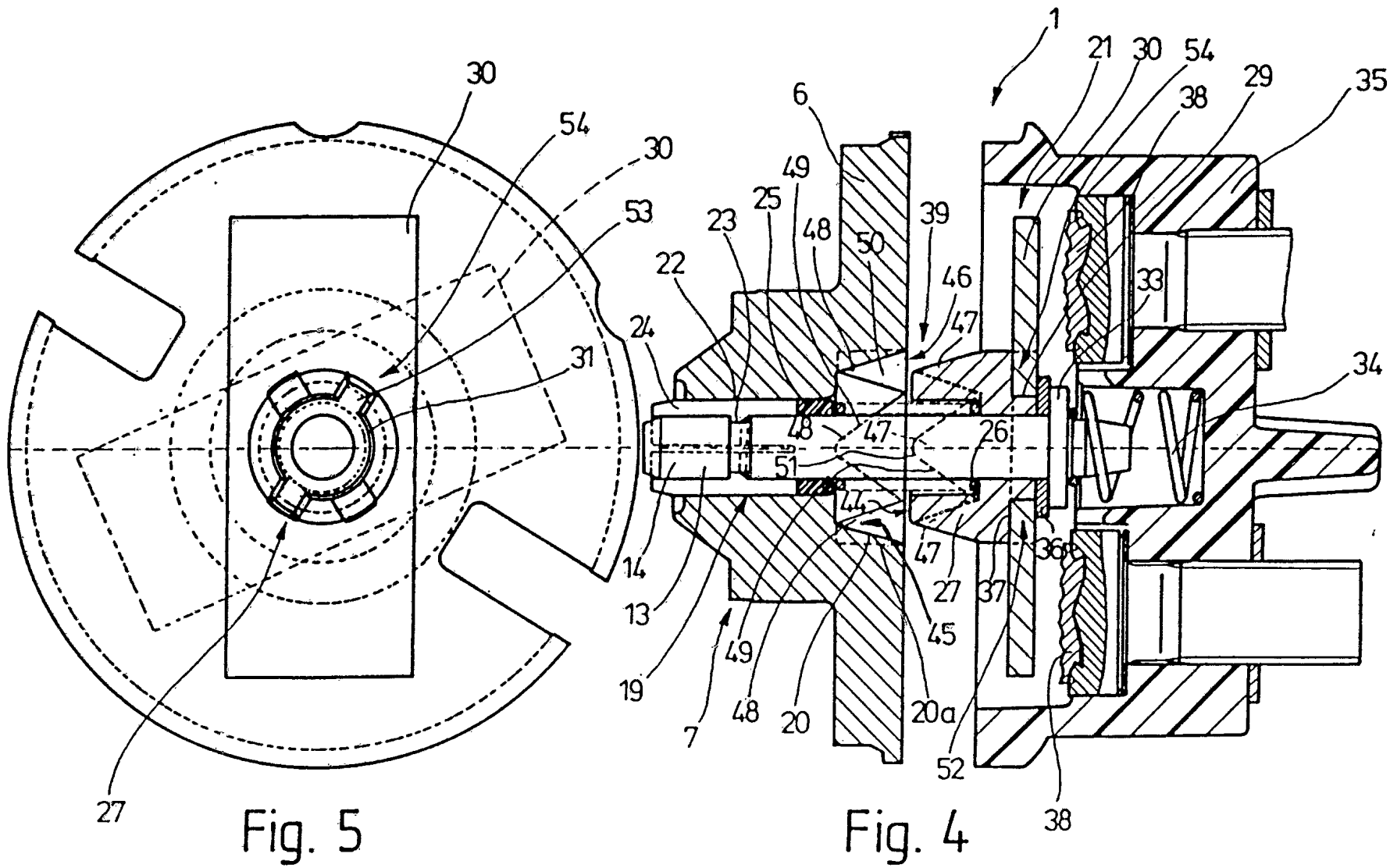


Fig. 3



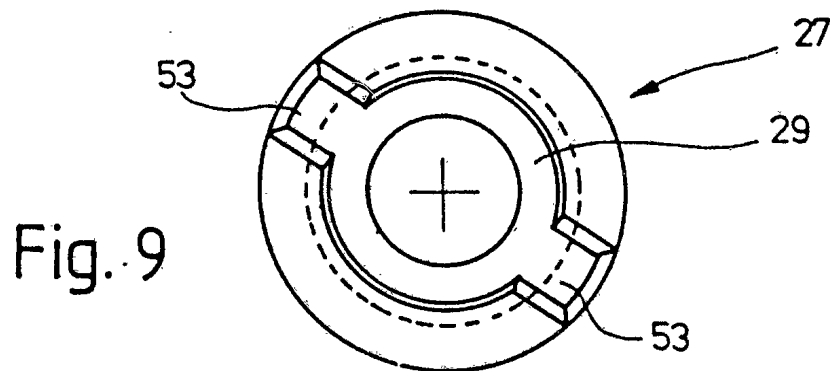
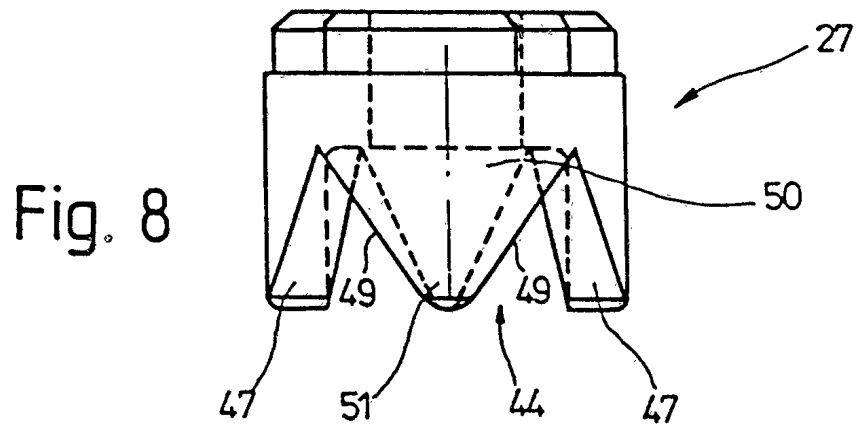
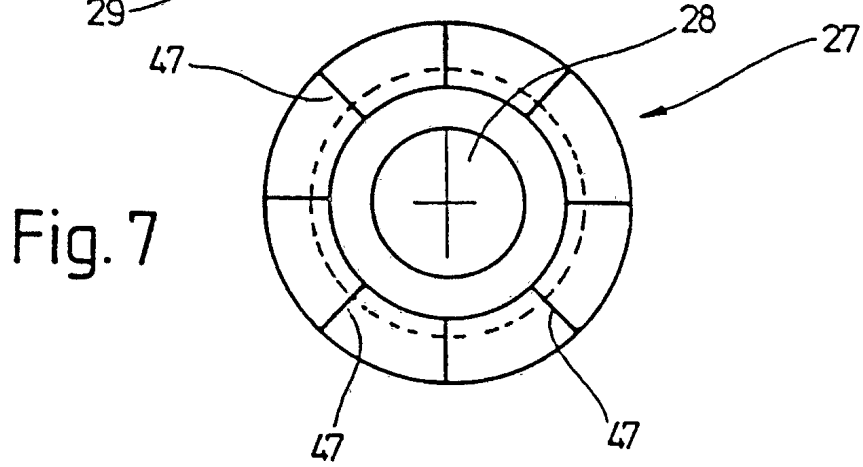
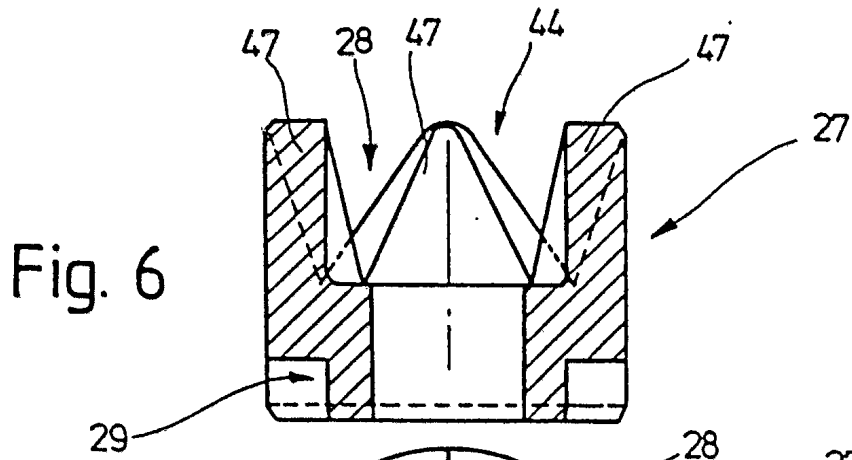


Fig.10

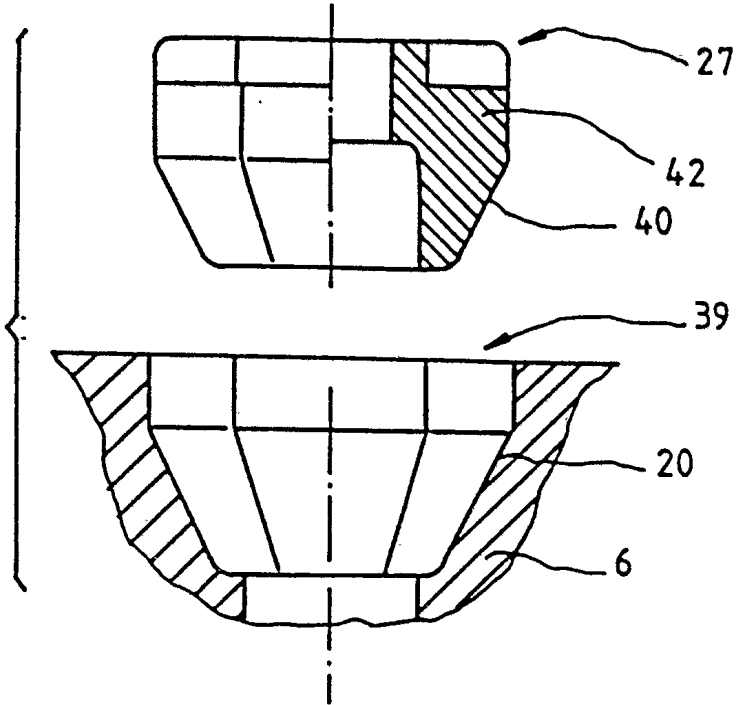
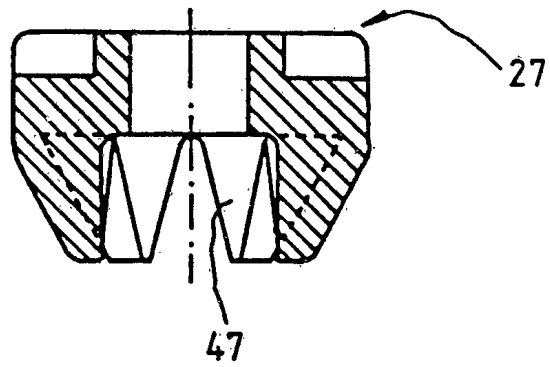


Fig.11



**INTERNATIONAL SEARCH REPORT**

International application No.  
PCT/DE 92/00329

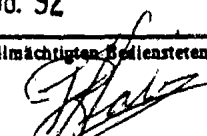
<b>A. CLASSIFICATION OF SUBJECT MATTER</b> Int. Cl. <sup>5</sup> H01H51/06 According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b> Minimum documentation searched (classification system followed by classification symbols) Int. Cl. <sup>5</sup> H01H Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	GB, A, 2 082 393 (BOSCH) 3 March 1982 see page 1, line 9 - line 69; figures 1,2 ---	1,2
Y	EP, A, 0 099 998 (BOSCH) 8 February 1984 see abstract -----	1,2
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search 29 July 1992 (29.07.92)		Date of mailing of the international search report 4 August 1992 (04.08.92)
Name and mailing address of the ISA. European Patent Office Facsimile No.		Authorized officer  Telephone No.



**ANNEX TO THE INTERNATIONAL SEARCH REPORT  
ON INTERNATIONAL PATENT APPLICATION NO. DE 9200329  
SA 58703**

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on  
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information. 29/07/92

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB-A-2082393	03-03-82	DE-A- 3030776	25-03-82
		FR-A- 2488657	19-02-82
EP-A-0099998	08-02-84	DE-U- 8221714	04-11-82
		JP-A- 59035335	27-02-84
		US-A- 4604597	05-08-86

I. KLASSIFIKATION DES ANMELDUNGSGEGENSTANDS (bei mehreren Klassifikationssymbolen sind alle anzugeben) <sup>6</sup>		
Nach der internationalen Patentklassifikation (IPC) oder nach der nationalen Klassifikation und der IPC		
Int.Kl. 5 H01H51/06		
II. RECHERCHIERTE SACHGEBIETE		
Recherchierter Mindestprüfstoff <sup>7</sup>		
Klassifikationssystem	Klassifikationssymbole	
Int.Kl. 5	H01H	
Recherchierte nicht zum Mindestprüfstoff gehörende Veröffentlichungen, soweit diese unter die recherchierten Sachgebiete fallen <sup>8</sup>		
III. EINSCHLAGIGE VERÖFFENTLICHUNGEN <sup>9</sup>		
Art. <sup>9</sup>	Kennzeichnung der Veröffentlichung <sup>11</sup> , soweit erforderlich unter Angabe der maßgeblichen Teile <sup>12</sup>	Betr. Anspruch Nr. <sup>13</sup>
Y	GB,A,2 082 393 (BOSCH) 3. März 1982 siehe Seite 1, Zeile 9 - Zeile 69; Abbildungen 1,2	1,2
	---	
Y	EP,A,0 099 998 (BOSCH) 8. Februar 1984 siehe Zusammenfassung	1,2
	---	
<p><sup>10</sup> Besondere Kategorien von angegebenen Veröffentlichungen <sup>10</sup> :</p> <p>"A" Veröffentlichung, die den allgemeinen Stand der Technik definiert, aber nicht als besonders bedeutsam anzusehen ist</p> <p>"E" Älteres Dokument, das jedoch erst am oder nach dem internationalen Anmeldedatum veröffentlicht worden ist</p> <p>"L" Veröffentlichung, die geeignet ist, einen Prioritätsanspruch zweifelhaft erscheinen zu lassen, oder durch die das Veröffentlichungsdatum einer anderen im Recherchenbericht genannten Veröffentlichung belegt werden soll oder die aus einem anderen besonderen Grund angegeben ist (wie ausgeführt)</p> <p>"O" Veröffentlichung, die sich auf eine mündliche Offenbarung, eine Benutzung, eine Ausstellung oder andere Maßnahmen bezieht</p> <p>"P" Veröffentlichung, die vor dem internationalen Anmeldedatum, aber nach dem beanspruchten Prioritätsdatum veröffentlicht worden ist</p> <p>"T" Spätere Veröffentlichung, die nach dem internationalen Anmeldedatum oder dem Prioritätsdatum veröffentlicht worden ist und mit der Anmeldung nicht kollidiert, sondern nur zum Verständnis des der Erfindung zugrundeliegenden Prinzips oder der ihr zugrundeliegenden Theorie angegeben ist</p> <p>"X" Veröffentlichung von besonderer Bedeutung; die beanspruchte Erfindung kann nicht als neu oder auf erfinderischer Tätigkeit beruhend betrachtet werden</p> <p>"Y" Veröffentlichung von besonderer Bedeutung; die beanspruchte Erfindung kann nicht als auf erfinderischer Tätigkeit beruhend betrachtet werden, wenn die Veröffentlichung mit einer oder mehreren anderen Veröffentlichungen dieser Kategorie in Verbindung gebracht wird und diese Verbindung für einen Fachmann naheliegend ist</p> <p>"A" Veröffentlichung, die Mitglied derselben Patentfamilie ist</p>		
IV. BESCHEINIGUNG		
Datum des Abschlusses der internationalen Recherche	Absenddatum des internationalen Recherchenberichts	
29. JULI 1992	4. 08. 92	
Internationale Recherchenbehörde	Unterschrift des bevollmächtigten Bediensteten	
EUROPAISCHES PATENTAMT	SALM R. 	

**ANHANG ZUM INTERNATIONALEN RECHERCHENBERICHT  
 ÜBER DIE INTERNATIONALE PATENTANMELDUNG NR.**

DE 9200329  
 SA 58703

In diesem Anhang sind die Mitglieder der Patentfamilien der im obengenannten internationalen Recherchenbericht angeführten Patentdokumente angegeben.

Die Angaben über die Familienmitglieder entsprechen dem Stand der Datei des Europäischen Patentamts am

Diese Angaben dienen nur zur Unterrichtung und erfolgen ohne Gewähr.

29/07/92

Im Recherchenbericht angeführtes Patentdokument	Datum der Veröffentlichung	Mitglied(er) der Patentfamilie	Datum der Veröffentlichung
GB-A-2082393	03-03-82	DE-A- 3030776	25-03-82
		FR-A- 2488657	19-02-82
EP-A-0099998	08-02-84	DE-U- 8221714	04-11-82
		JP-A- 59035335	27-02-84
		US-A- 4604597	05-08-86

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