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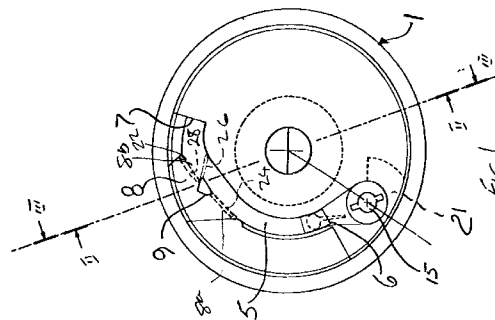
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**Switch.**

A switch is disclosed comprising a base (1) having therein an elongate first channel (5). A second channel (8) is connected at opposite ends to the first channel and is separated therefrom by an island (9). A rotor member movable on the base has a latch structure pivotally mounted thereon. The latch includes a peg which projects from the latch into one or other of the channels to follow the channel as the rotor is moved relative to the base. The latch structure also includes a wiper arranged to engage the island to divert the peg from the first channel into one end of the second channel in one direction of movement of the rotor. When the peg is in the second channel, it is prevented from re-entering the first channel by moving in a direction opposite to that in which it entered the second channel, thereby preventing the member from moving in the opposite direction.



**EP 0 560 606 A1**

This invention relates to a switch and a particular, but not sole, application of the invention is to a rotary switch for a motor vehicle.

A rotary switch usually comprises a first or base part and a second part, sometimes referred to as a rotor, arranged for rotation relative to the base. Switch contacts are provided so that various sets of contacts are opened and closed in different angular positions of the rotor relative to the base. A rotary switch suitable for use as the "ignition" switch of a motor vehicle usually has the following operating positions:-

an OFF position; an ACCESSORIES position; an IGNITION position; and a START position.

In use, the switch is moved from the OFF position to the ACCESSORIES position, in which the accessories, such as the windscreen wipers, heater and radio, can be energised individually if required. From the ACCESSORIES position the switch is moved to the IGNITION position in which the ignition system of the engine is energised. In order to start the engine, the switch is turned to the START position and, as soon as the engine fires, the switch is returned to the IGNITION position. If the engine does not fire within a few seconds it is usual to return the switch to the IGNITION position and then to re-apply it to the START position.

When the engine of an automobile is running, particularly at idling speeds, the driver may forget that the engine is running and attempt to start the engine by turning the switch from the IGNITION position to the START position. This can cause damage to the motor starter and is therefore undesirable.

An object of the invention is to provide a switch in which the undesirable operation of the switch is prevented.

According to a first aspect of the present invention, a switch comprises a base; a member movably mounted on the base, characterised in that one of said base and said member has therein an elongate first channel and a second channel connected at opposite ends to the first channel and separated therefrom by an island; a latch structure including a peg movably mounted on the other of said base and said member, said peg projecting into one or other of the channels to follow the channel as the member is moved relative to the base; the latch structure also including diverter means to divert the peg from the first channel into the second channel in one direction of movement of the member and, when the peg is in the second channel, to prevent the peg from re-entering the first channel by moving in a direction opposite to that in which it entered the second channel thereby limiting movement of the member in the opposite direction.

Once the peg has entered into the second channel, it can only leave the second channel through the end which is other than that through which it entered the channel. In the envisaged use as an "ignition"

switch of a motor vehicle, return to the START position can thus be prevented until the switch has first returned to the OFF position .

Preferably movement of the peg in the second channel in the direction opposite to that in which it entered the channel, brings the peg into engagement with an abutment surface in the second channel preventing further movement in that direction.

In a preferred arrangement, the diverter means comprises a wiper arranged to engage the island to divert the peg.

In order to prevent the peg from returning accidentally to the first channel, the island is preferably positioned so that movement of the peg into the first channel and bypassing engagement with the abutment surface would be prevented by engagement between the wiper and the island.

Further in order to prevent the peg from accidentally entering the wrong end of the second channel when the peg is moving in the first channel in the said opposite direction, movement into the second channel is preferably prevented by engagement of the wiper and a wall of the first channel.

The latch structure is preferably pivotally mounted on the movable member.

Preferably, the wiper is resiliently mounted on the peg.

In an alternative arrangement, the diverter means may comprise a wiper arranged to engage the peg to divert the peg.

In the envisaged use, the said movable member is preferably mounted for rotary movement relative to the base and said first channel is generally arcuate.

According to a second aspect of the present invention a rotary switch comprises a base having therein an elongate first channel; a second channel connected at its opposite ends to the first channel to bypass a part of the first channel; and a diverter projection located between the first and second channels; a rotor rotatably mounted on the base; a latch structure pivotally mounted on the rotor and including a peg which projects from the latch into one or other of said channels to follow the channel as the rotor is rotated relative to the base, the latch structure also including a flexibly mounted wiper arranged to engage the diverter projection to divert the peg from the first channel to the second channel in one direction of rotation of the rotor, the arrangement being such that, when the peg has entered the second channel, it is prevented from re-entering the first channel by moving it in the opposite direction to that in which it entered the second channel thereby preventing the rotor from rotating in the opposite direction of rotation.

When the switch is used as a switch on a motor vehicle, when the peg is at one end of the first channel the switch is in the OFF position and when the peg is at the opposite end of the first channel the switch is in the START position. The switch can be moved

progressively from the OFF position through the ACCESSORY and IGNITION positions to the START position by rotating the rotor in one direction of rotation and the peg moves along the first channel from one end to the other. When the direction of rotation of the rotor is reversed the peg moves from the START position in the first channel and is diverted to a position in the second channel corresponding to the IGNITION position. If an attempt is made to reverse the direction of rotation of the rotor again, so as to move the peg from the position in the second channel to the START position in the first channel, this movement is prevented by the peg abutting against an abutment surface. The peg can only re-enter the first channel from the second channel by moving the peg out of the second channel through the end of the channel which is other than that through which it entered the second channel. This entails moving the rotor towards the ACCESSORIES position switching off the engine and then it can be moved in the first direction of rotation so that the peg moves along the first channel through the IGNITION position to the start POSITION. Thus it is impossible to move the switch from the IGNITION position to the START position when the engine is running.

In order that the invention may be more readily understood it will now be described, by way of example only, with reference to the accompanying drawings, in which:-

Figure 1 is a plan view, with the top removed, of a rotary switch according to the invention;

Figure 2 is a section on the line II-II of Figure 1;

Figure 3 is a section on the line III-III of Figure 1;

Figure 4 is a plan of a latch structure forming part of the switch;

Figure 5 is a side view of the latch structure shown in Figure 4; and

Figures 6 - 13 are plan views, similar to Figure 1, showing relative movement between the rotor and the base of the switch.

A rotary switch suitable for use as the "ignition" switch of a motor vehicle comprises a generally cylindrical base member 1 and a rotor 2. The base member has a flat annular plate 3 usually with an upstanding peripheral wall 4. Formed in the surface of the annular plate 3 there is a generally arcuate first elongate channel 5 which extends between end walls 6 and 7 as part of an arc for about 120°.

A part of the length of the first channel is bypassed by a second channel 8. The opposite ends of the second channel are connected to the first channel at junctions 8a and 8b away from the ends of the first channel. An island in the form of a diverter projection 9 projects from the plate 3 and is disposed between the channels 5 and 8.

The rotor 2 has a spindle 12 which is rotatable in the central opening of the plate 3 and the spindle extends from one side of an enlarged collar 13 which

rests on the surface of the plate 3. On the opposite side of the collar to the spindle there is a plate 14. A pivot pin 15 extends from plate 14 parallel to and to one side of the spindle 12.

A latch structure 16 is movably mounted on the pivot pin 15. The structure comprises an arm 17 pivotably mountable adjacent one end on the pivot pin 15 and carrying a peg 19 adjacent the opposite end. The peg extends parallel to the spindle 12. A diverter means in the form of a resiliently flexible wiper 20 is mounted on or is integral with the peg 19. The wiper is normally inclined by a small angle to the line joining the axis of rotation of the pivot pin 15 and the axis of the peg 19 as shown in Figure 4. An abutment block 21 on the plate 14 adjacent the pivot pin 15 permits rotation of the latch structure through a limited angle relative to the plate 14.

In use, the rotor is mounted with the spindle in the base and with the peg 19 extending into the first channel 5. The position shown in Figure 6 is the OFF position, the peg 19 is close to the end wall 6 of the channel. On rotating the rotor in the clockwise direction, it moves to the ACCESSORIES position shown in Figure 7 where the peg is still in the first channel 5. The peg 19 is at the junction 8a between the first and second channels and is prevented from chance entry into the channel 8, because the wiper 20 would engage the outer wall of the first channel 5. On further rotation of the rotor it moves to the IGNITION position shown in Figure 8. In order to ensure completely positive action, the wiper 20 is sufficiently long that the peg 19 has travelled too far in the channel 5 to be able to enter the channel 8, before the wiper 20 has cleared the center wall of the channel 5 at the junction 8a. From the IGNITION position the rotor can be moved further in the clockwise direction and the peg continues to move along the first channel to adjacent the abutment surface 7, as shown in Figure 7, where the rotor is in the START position.

The diverter projection 9 is so positioned that when the rotor is in the start position, the wiper 20 projects out of the channel 5 and into the channel 8 at the junction 8b. The rotor cannot move further in the clockwise direction and on rotating the rotor in the anti-clockwise direction, the peg 19 starts to move back along the first channel until the wiper 20 engages the diverter 9 on its outside and thus causes the latch assembly to pivot about the pivot 15 to divert the peg into the second channel 8. The movement in this direction continues until the IGNITION position is reached again as shown in Figure 11. If an attempt is now made to rotate the rotor in the clockwise direction, the peg moves in the second channel until the free end of the arm 16 abuts against an abutment surface 22 adjacent one end of the second channel. In this position, as shown in Figure 12, the arm is held at one end by the surface 21 and at the other end by the surface 22, and consequently the rotor cannot be

moved back to the START position.

From this position, the rotor can only be rotated in the anti-clockwise direction to withdraw the peg from the second channel into the first channel as shown in Figure 13. It will be appreciated that the peg can only be withdrawn from the second channel through the opposite end to that through which it entered the second channel. Once the peg is back in the first channel the rotor can be rotated in either direction of rotation as required.

The electrical contacts which are provided on the rotary switch are not shown in the figures for the sake of clarity.

Although the invention is particularly suitable as described in a rotary switch, the switch can be of linear form in which the member carrying the latch structure moves in a straight-line relative to the base.

In an alternative arrangement (not illustrated) the channel could be formed in the rotor and the latch mounted on the base.

In yet another alternative arrangement the wiper 20 is replaced by a flexible wiper or gate 24 (shown in broken outline in Figure 1) across the junction 8a and a flexible wiper 26 shown in broken outline in Figure 1) at the junction 8b. In this arrangement the wipers or gates are flexibly mounted on the island. In its normal position the wiper or gate 24 closes the junction 8a. The wiper or gate 26 lies obliquely across the first channel so that when the peg 19 is moving clockwise in the first channel 5, the wiper or gate flexes to allow the peg past. When the peg returns, however, the wiper or gate 26 guides it into the second channel 8. A third wiper or gate 28 flexibly mounted on the outer wall of the first channel at the junction 8b, could be provided to prevent accidental return of the peg into the first channel. Movement of the peg into the second channel would be allowed by flexure of the wiper or gate 28.

## Claims

1. A switch comprising: a base; a member movably mounted on the base, characterised in that one of said base and said member has therein an elongate first channel and a second channel connected at opposite ends to the first channel and separated therefrom by an island; a latch structure including a peg movably mounted on the other of said base and said member, said peg projecting into one or other of the channels to follow the channel as the member is moved relative to the base; the latch structure also including diverter means to divert the peg from the first channel into the second channel in one direction of movement of the member and, when the peg is in the second channel, to prevent the peg from re-entering the first channel by moving in a direction

opposite to that in which it entered the second channel thereby limiting movement of the member in the opposite direction.

2. A switch as claimed in claim 1, wherein movement of the peg in the second channel in the direction opposite to that in which it entered the channel, brings the peg into engagement with an abutment surface in the second channel preventing further movement in that direction.
3. A switch as claimed in claim 1 or 2, wherein the diverter means comprises a wiper arranged to engage the island to divert the peg.
4. A switch as claimed in claim 3 when appendent to claim 2, wherein the island is positioned so that movement of the peg into the first channel and bypassing engagement with the abutment surface would be prevented by said engagement of said wiper with said island.
5. A switch as claimed in claim 3 or 4, wherein when the peg is moving in the first channel in the said opposite direction, movement into the second channel would be prevented by engagement of the wiper and a wall of the first channel.
6. A switch as claimed in any preceding claim, wherein the latch structure is pivotally mounted on the movable member.
7. A switch as claimed in any preceding claim in which the wiper is resiliently mounted on the peg.
8. A switch as claimed in claim 1, wherein the diverter means comprises a wiper arranged to engage the peg to divert the peg.
9. A switch as claimed in any preceding claim, wherein said movable member is mounted for rotary movement relative to the base and said first channel is generally arcuate.
10. A rotary switch comprising a base having therein an elongate first channel; a second channel connected at its opposite ends to the first channel to bypass a part of the first channel; and a diverter projection located between the first and second channels; a rotor rotatably mounted on the base; a latch structure pivotally mounted on the rotor and including a peg which projects from the latch into one or other of said channels to follow the channel as the rotor is rotated relative to the base, the latch structure also including a flexibly mounted wiper arranged to engage the diverter projection to divert the peg from the first channel to the second channel in one direction of rotation

of the rotor, the arrangement being such that, when the peg has entered the second channel, it is prevented from re-entering the first channel by moving it in the opposite direction to that in which it entered the second channel thereby preventing the rotor from rotating in the opposite direction of rotation.

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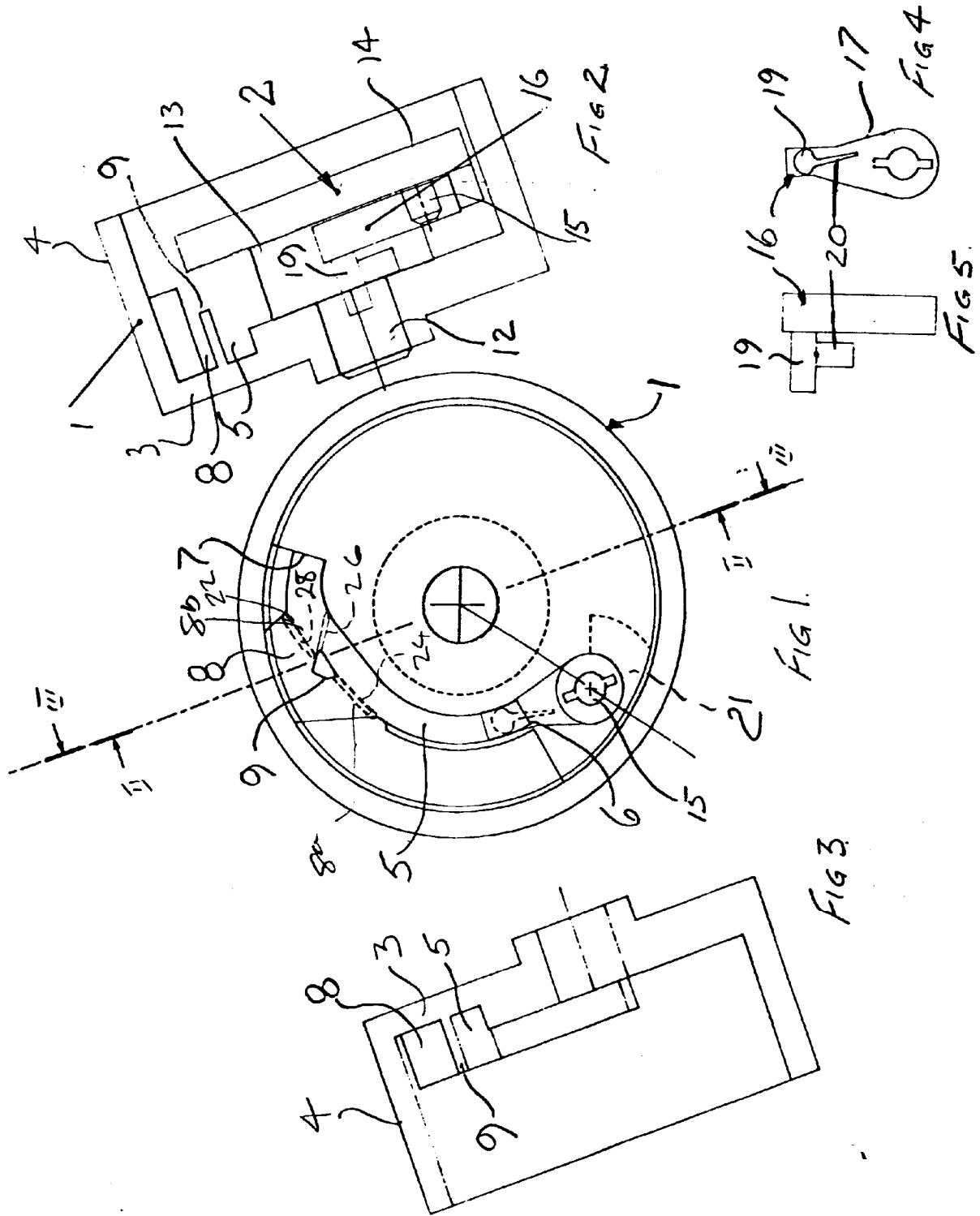
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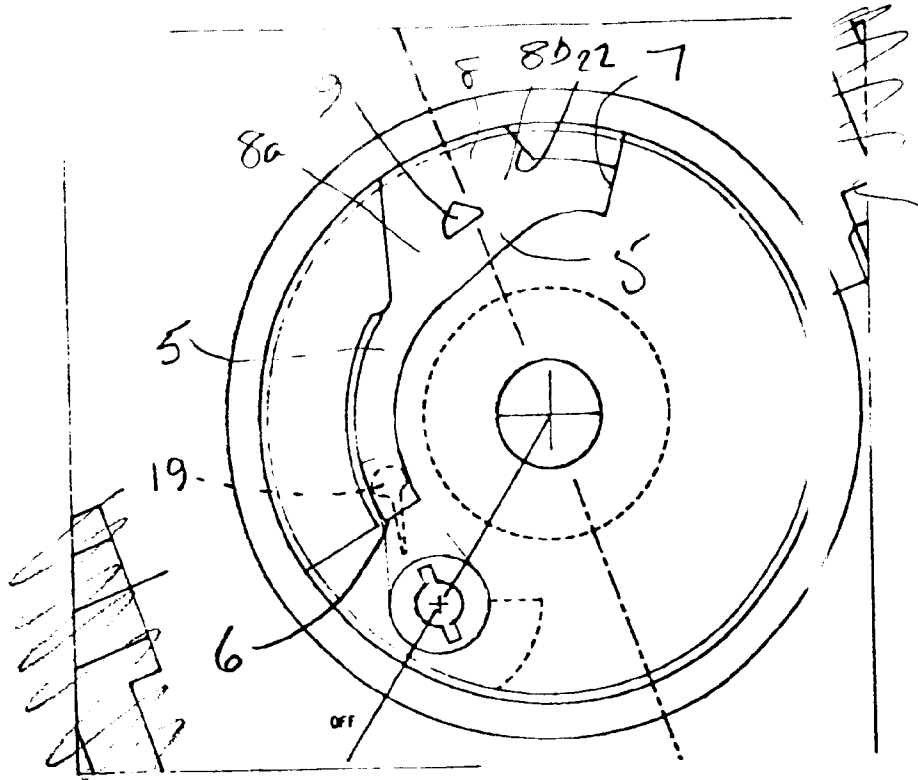


Figure 6

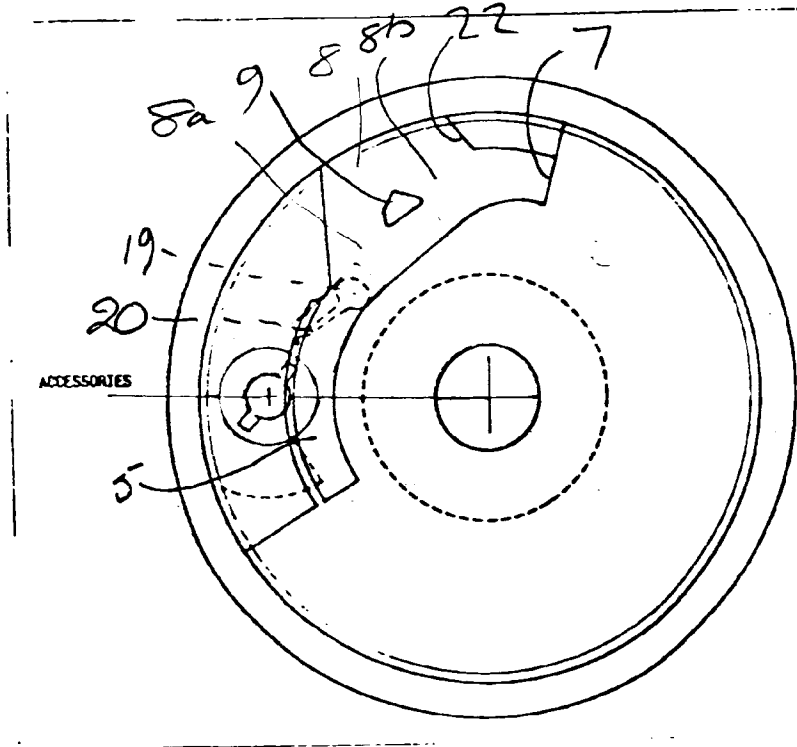


Figure 7

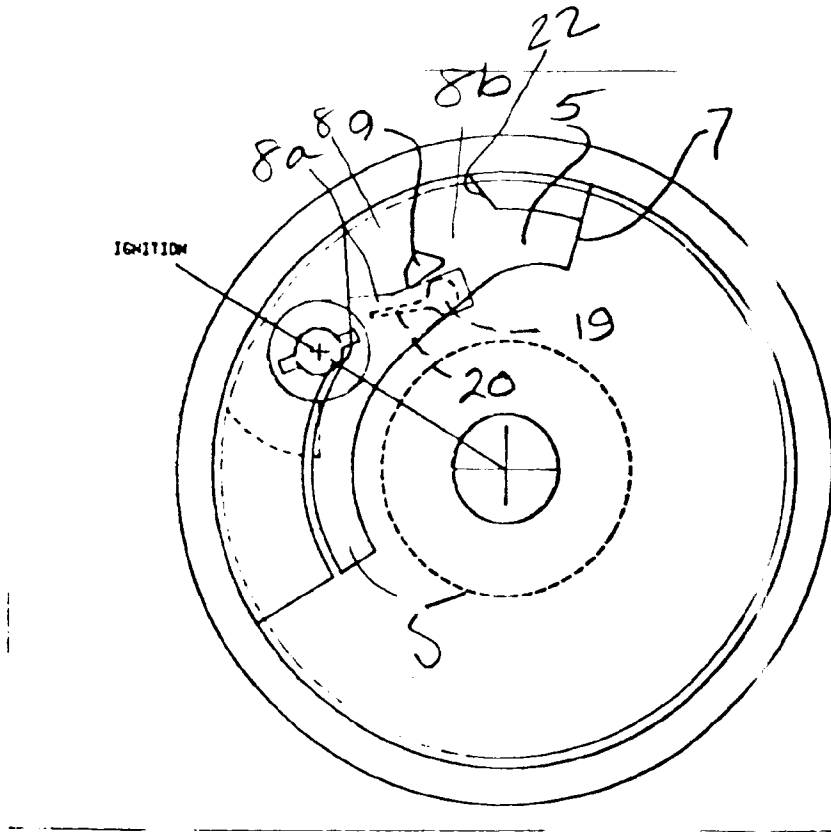


Figure 8

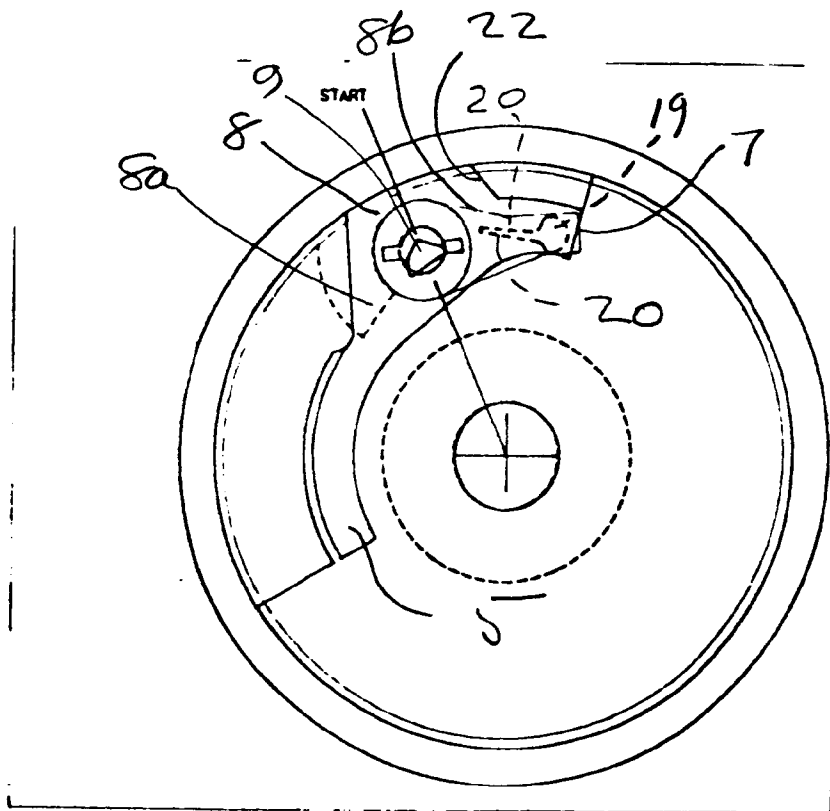


Figure 9

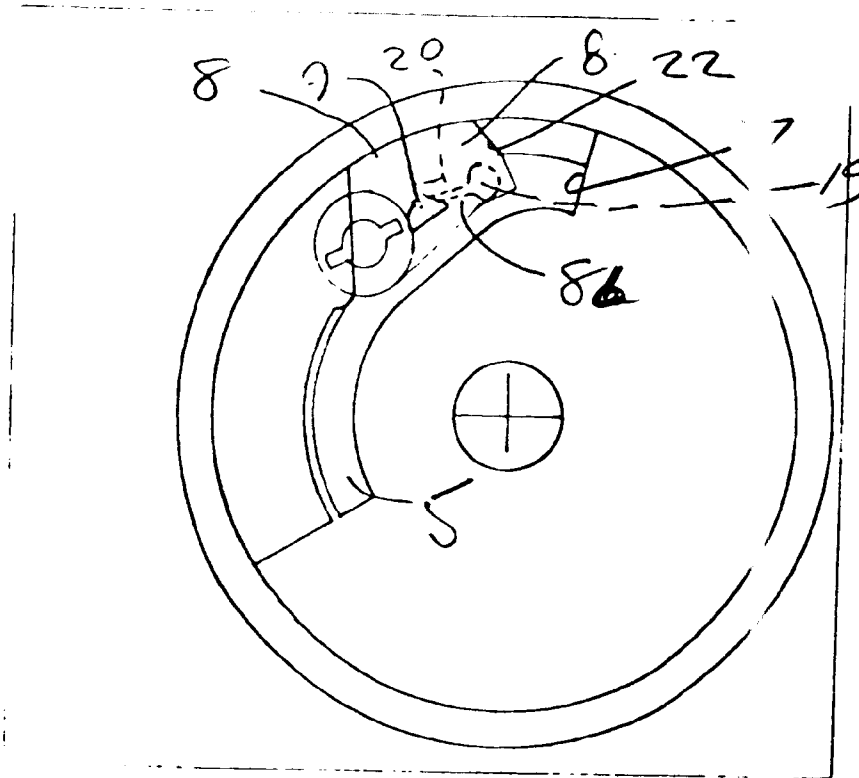


Figure 10

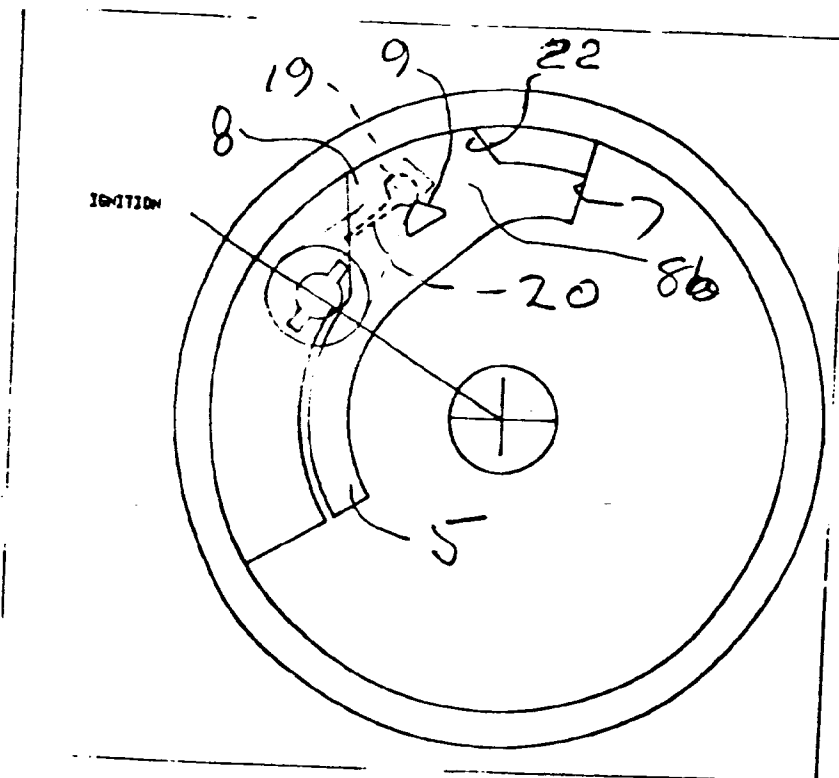


Figure 11

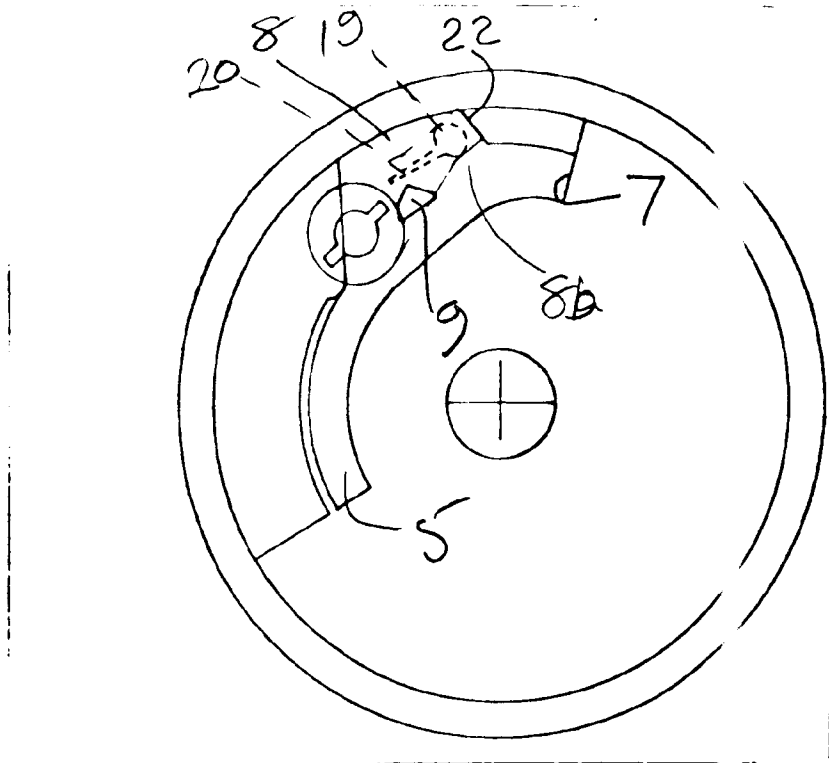


Figure 12

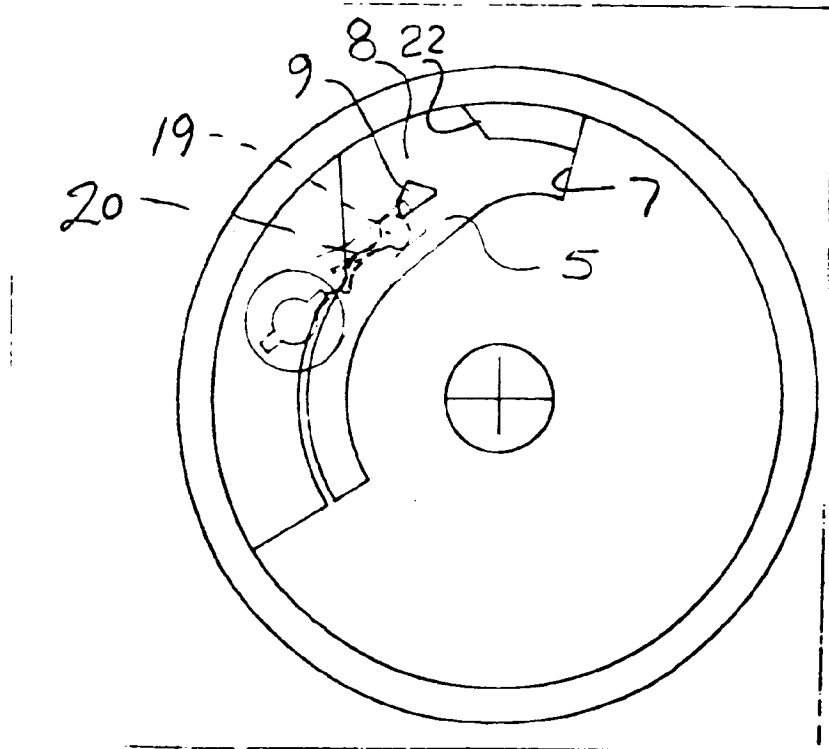


Figure 13



European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 93 30 1846

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X A	GB-A-1 335 809 (A. B. ELECTRONIC COMPONENTS)  * claims 1-4,7,8; figures 1,2 * ---	1,2,6,9  10	H01H27/06
X	FR-A-1 294 455 (TELEPHONE MANUFACTURING COMPANY) * page 2, right column, paragraph 8 - page 3, right column, paragraph 2; figures 1-4 *	1,2	
X A	FR-A-2 029 600 (MERIT-WERK MERTEN & CO.)  * page 2, line 3 - page 3, line 1; figures 1,2 *  -----	1 10	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			H01H
Place of search	Date of completion of the search	Examiner	
BERLIN	04 JUNE 1993	NIELSEN K.G.	
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ..... & : member of the same patent family, corresponding document	

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