

AUSTRALIA  
Patents Act 1990

P/00/001  
Section 29

655833

**PATENT REQUEST : STANDARD PATENT**

The person identified below as the Applicant requests the grant of a patent to the person identified below as the Nominated Person, for an invention described in the accompanying standard complete specification.

Applicant: MERIT-ELEKTRIK GmbH  
Address: Kaiserstraße 177a, 5270 Gummersbach 1, GERMANY  
Nominated Person: MERIT-ELEKTRIK GmbH  
Address: Kaiserstraße 177a, 5270 Gummersbach 1, GERMANY  
Invention Title: MULTIPLE CONTACT, PARTICULARLY FOR MOTOR VEHICLE  
Names of Actual Inventors: Günter Merten  
Address for Service: GRIFFITH HACK & CO  
168 WALKER STREET  
NORTH SYDNEY NSW 2060  
Attorney Code: GH

**BASIC CONVENTION APPLICATION DETAILS**

Application No	Country	Country Code	Date of Application
P 41 28 315.5	Germany	DE	27 August 1991

DATED this 20th day of August 1992

MERIT-ELEKTRIK GmbH  
By their Patent Attorney

  
GRIFFITH HACK & CO

S 031649 240892

AUSTRALIA  
Patents Act 1990

**NOTICE OF ENTITLEMENT**

We **MERIT-ELEKTRIK GmbH**

of **Kaiserstraße 177a, 5270 Gummersbach 1, GERMANY**

being the Applicant and Nominated Person, in respect of Application No. 21268/92,  
entitled **MULTIPLE CONTACT, PARTICULARLY FOR MOTOR VEHICLE** state the  
following:

Günter Merten is the actual inventor of the invention.

The nominated person is entitled to the rights in the invention by virtue of an  
agreement with the inventor.

Convention priority is claimed from the following basic application(s):

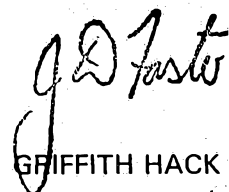
<b>Basic Applicant</b>	<b>Application Number</b>	<b>Application Date</b>	<b>Country</b>	<b>Country Code</b>
MERIT-ELEKTRIK GmbH	P 41 28 315.5	27 August 1991	Germany	DE

The basic application was the first application made in a Convention country in respect  
of the invention the subject of this request.

DATED this 15th day of September 1993

MERIT-ELEKTRIK GmbH

By their Patent Attorney



GRIFFITH HACK & CO



AU9221268

(12) PATENT ABRIDGMENT (11) Document No. AU-B-21268/92  
(19) AUSTRALIAN PATENT OFFICE (10) Acceptance No. 655833

- (54) Title  
**MULTIPLE CONTACT, PARTICULARLY FOR MOTOR VEHICLE**
- International Patent Classification(s)  
(51)<sup>5</sup> **H01H 001/16**
- (21) Application No. : **21268/92** (22) Application Date : **24.08.92**
- (30) Priority Data
- (31) Number (32) Date (33) Country  
**4128315 27.08.91 DE GERMANY**
- (43) Publication Date : **04.03.93**
- (44) Publication Date of Accepted Application : **12.01.95**
- (71) Applicant(s)  
**MERIT-ELEKTRIK GMBH**
- (72) Inventor(s)  
**GUNTER MERTEN**
- (74) Attorney or Agent  
**GRIFFITH HACK & CO. , GPO Box 4164, SYDNEY NSW 2001**
- (56) Prior Art Documents  
**DE 3441161**  
**DE 3219853**  
**DE 3315994**
- (57) Claim

1. A multiple contact switch for a motor vehicle comprising;

a switch base;

a first fixed contact arranged on the switch base;

a second fixed contact arranged on the switch base radially outwardly from the first fixed contact;

a contact portion;

a bridge conductor having a contact surface for producing friction and a contact roller, the bridge conductor being in contact with the first fixed contact and arranged so that the contact roller can be brought into contact with the second fixed contact; and

a drive means for bringing the contact roller into contact with the second fixed contact and for bringing the contact surface of the bridge conductor into contact with the contact portion;

(11) AU-B-21268/92  
(10) 655833

-2-

wherein the drive means is moveable with respect to the switch base and the friction is produced by the contact surface when the contact surface is brought into contact with the contact portion and the bridge conductor is driven over the <sup>contact</sup>~~raised~~ portion by the drive means, and wherein the friction produced by the contact surface causes the contact roller of the bridge conductor to be rotated.

P/00/011  
Regulation 3.2

AUSTRALIA  
Patents Act 1990

655833

**ORIGINAL**  
**COMPLETE SPECIFICATION**  
**STANDARD PATENT**

Invention Title:        **MULTIPLE CONTACT, PARTICULARLY FOR  
MOTOR VEHICLE**

The following statement is a full description of this invention, including  
the best method of performing it known to us:

GH&CO REF: P21379-B:DAA:RK

### BACKGROUND OF THE INVENTION

The present invention relates to a multiple contact, in particular for motor vehicles.

5 More particularly, it relates to a multiple contact which has an input fixed contact arranged on a switch base and a plurality of output fixed contacts which can be connected with the input fixed contact by one or several contact bridges controlled by ramps and cooperating control parts. The contact bridges are supported on a driver which is turnable or  
10 displaceable relative to the switch base under the action of pressure springs which produce the required contact pressure between contact bridge and the input fixed contact on the one hand and contact bridge and fixed contact on the other hand and which are individually guided. Each contact bridge has free-  
15 ly rotatable axles relative to the driver and rolls with a contact roller on the output fixed contacts and directly cooperates through a control part with the control ramp.

A multiple switch, particularly for a motor vehicle can have an input fixed contact arranged on the switch base and a plurality of output fixed contacts which can be  
20 connected with the input fixed contact by one or several contact bridges controlled by ramps and cooperating control parts, with the contact bridges supported on a driver rotatable or displaceable relative to the switch base under  
25 the action of pressure springs which produce the required

1 contact pressure between contact bridges and input fixed  
contact on the one hand, and the contact bridges and fixed  
contact on the other hand and guided individually. Here,  
each contact bridge has an axle which is freely rotatable  
5 relative to the driver with a contact roller which rolls on  
the output fixed contacts. The contact roller is arranged  
rotatably on the axle of the contact bridge and cooperates  
directly with a control ramp through a control part.

10 The present invention is a further development of  
the prior art as disclosed in the German documents DE  
34 41 161 A1, DE 33 15 994 C2 and DE 32 19 852 A1.

15 It has been recognized that in such multiple  
switches with increasing operation life the contact burning  
between the contact rollers of the contact bridges and the  
outwardly located fixed contacts can occur at predetermined  
permanent points. Therefore the operational safety of such  
switches can be affected without limiting the remaining  
regions of the contact parts in their operational ability by a  
contact burning.

20 German document DE 34 41 161 A1 shows a multiple  
switch, especially for a motor vehicle which has a fixed  
contact arranged on a switch base and a plurality of output  
fixed contacts which can be connected with the input fixed  
contact by one or several contact bridges controlled by ramps  
25 and cooperating control parts. The contact bridges are



1 supported on a driver which is turnable and displaceable  
relative to the switch base under the action of pressure  
springs which produce the required contact pressure between  
contact bridge and input fixed contact  
5 on the one hand and contact bridge and fixed contact on the  
other hand and are guided individually. Each contact bridge  
has either an axle which is freely rotatable relative to the  
driver and rolls with a contact roller on the output fixed  
10 contacts, or a contact roller which is rotatably arranged on  
the axle of each contact bridge. Each contact bridge or  
contact roller directly cooperates with the control ramp through  
its control part. In these multiple switches the contact  
rollers are formed themselves as control parts which cooperate  
with the control paths or ramps.

15 German patent application DE C 8013 VIIIb/21c filed  
on August 6, 1953 and published on October 31, 1956 discloses  
a contact arrangement for switching devices with a contact  
roller. In this arrangement the contact roller for avoiding  
the damaging action of switching sparks and light arcs during  
20 the contact performs a small rotation and therefore the  
contact establishment during the following switching is  
performed at another location of the roller. The current turn  
on and turn off is performed in this contact arrangement in  
that a contact block is placed onto the outer surface of the  
25 contact roller or lifted from it. The contact surface of the



1 contact block slightly deviates from the rectangular position  
relative to the movement direction of the contact block, so  
that the contact pressure does not extend through the center  
point of the roller. Thereby a torque is applied to the  
5 roller and results in a turning of the roller. Such a  
construction is however not suitable for the use in multiple  
switches of the above mentioned type in which the contact  
establishment and the contact lifting of the contact rollers  
is controlled by ramps.

10 The same is true for a further contact arrangement  
which is disclosed in the German document DE-GM 16 94 862<sup>published on 11 May 1954</sup>, and  
is used for switching and regulating devices with contact  
rollers. Here the contact rollers are formed not  
cylindrically for reducing the contact friction, but instead  
15 have a spherical construction. The contact rails or contact  
paths can be flat and can be provided with a groove shaped  
depression. The contact rollers are inclined to produce a  
sliding movement which results first in a self cleaning during  
the switching process, and also due to the rotation of the  
20 contact rollers relative to the contact paths other contact  
points are formed. This known contact arrangement is however  
not suitable for multiple switches of the above mentioned  
general type for the reasons specified hereinabove.

25 U.S. Patent 2,820,126 discloses a contact roller  
with a flanged peripheral surface which produces a rubbing



1 friction during rotation of the contact roller about its  
longitudinal axis by a direct engagement with the contact  
surface on a fixed contact bench. Since the contact roller  
with its flanged peripheral surface can however come in  
5 contact directly with the outer surface of the fixed contact,  
the rubbing friction continuously changes because of the  
unavoidable contact burning at the contact roller. Therefore  
a controllable turning of the contact roller in each switching  
step is not possible.

10 Contact rollers with a contact surface which has an  
increase friction are disclosed for example in the German  
document DE-OS 29 09 585. Here the contact rollers are  
composed at least in the region of their outer cylindrical  
surface at least locally, of rubber or other synthetic plastic  
15 which is made conductive due to addition of conductive  
particles (metal dust). The turning or displacing switch  
provided with such contact rollers has however a high wear  
resistance and operational safety especially contact  
reliability, during selective connection of contact surfaces  
20 which are formed as conductor paths and are located relatively  
close to one another on an isolating material plate.

SUMMARY OF THE INVENTION

Accordingly, it is an aim of the present invention to ameliorate at least some of the problems of the prior art.

5 In a first aspect of the present invention there is provided a multiple contact switch for a motor vehicle comprising;

a switch base;

10 a first fixed contact arranged on the switch base;

a second fixed contact arranged on the switch base radially outwardly from the first fixed contact;

a contact portion;

15 a bridge conductor having a contact surface for producing friction and a contact roller, the bridge conductor being in contact with the first fixed contact and arranged so that the contact roller can be brought into contact with the second fixed contact; and

20 a drive means for bringing the contact roller into contact with the second fixed contact and for bringing the contact surface of the bridge conductor into contact with the contact portion;

25 wherein the drive means is moveable with respect to the switch base and the friction is produced by the contact surface when the contact surface is brought into contact with the contact portion and the bridge conductor is driven over the <sup>contact</sup> ~~raised~~ portion by the drive means, and wherein the friction produced by the contact surface causes the contact roller of the bridge conductor to be  
30 rotated.

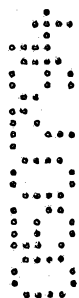
35 It is an advantage that the present invention embodies a multiple contact which has an improved service life and electrical loading capacity and therefore the reliability, obtained with simply technical means and in which the contact burning both on the rotatable contact points and also on the fixed contacts is better distributed over the whole contact surfaces.



It is an advantage that the present invention embodies a multiple contact switch in which each contact bridge which comes into contact with a ramp portion has a peripheral surface which produces a rubbing friction for turning the contact bridge with the contact roller about their longitudinal axis.

Advantageously the contact roller on its control part which comes into contact with the ramp can also have a peripheral surface which produces a rubbing friction for turning the contact roller about its longitudinal axis.

In both above described embodiments each contact bridge or contact roller on its control part which comes into contact with the control ramp has a peripheral surface which



1 produces a rubbing friction in direction of turning of the  
contact bridge or the contact roller. This provides the  
advantage that the contact bridge or the contact roller is  
positively turned independently and separately from the  
5 electrical contact establishment when it comes in engagement  
with the control ramp. Since in the moment of contact of the  
control part of the contact bridge or the contact roller with  
the control ramp a minimal slippage occurs, before the contact  
roller or the contact with the contact roller mounted on it  
is displaced in rotation, the contact point is displaced on  
the periphery of the contact roller which forms the contact  
surface during each individual switching step in a stepped  
manner in a peripheral direction. Therefore during longer  
operational time, gradually step by step the whole periphery  
of the contact roller becomes available as contact points. As  
a result the possibility of a local contact burning at a  
periphery of the contact roller is substantially reduced and  
the service life of such a switch is substantially increased.

20 In another embodiment of the present invention, in  
order to produce the required rubbing friction for  
turning the contact roller or the contact bridge about  
their longitudinal axes, the peripheral surface of the  
control part can be provided with roughening or knurling.

25 On the other hand, the peripheral surface of the  
contact roller or the contact bridge which comes into contact



1 with the control ramp, can be provided with suitable friction coating. The coating can be formed for example as an adhesive surface provided on the outer periphery of a plug sleeve.

5 Advantageously, the multiple switch either independently or in connection with the roughening or knurling of the control part for the contact roller, can be formed conical or spherical on the contact roller of each contact bridge which rolls over the fixed contact. With increasing contact burning, on the periphery of the contact roller a burning displacement in direction of the longitudinal axis of the contact bridge is produced.

10 During continuous use of the switch a contact burning occurs on the outer periphery of the conical or spherical contact rollers which is in contact with the fixed contact. Thereby the diameter of the contact roller is reduced and the contact point between the contact roller and the fixed contact is displaced in direction of the longitudinal axis of the rotating contact bridge. As a result, clean, undamaged contact surfaces come into operation on these contact points. The thusly produced axial burning displacement increases the service life of the switch. The combination of the radial and axial burning displacement on the periphery of the contact roller, in addition to the ramp-controlled contact roller system basically improves the

20

25



1 contact, this is an extraordinarily high electrical load  
capacity with long service life in such multiple switches,  
with simultaneous too low contact vibrations. This is  
especially important in modern motor management systems of  
5 power vehicles.

The present invention, both as to its construction  
and its method of operation, together with advantages  
thereof, will be best understood from the following  
description of specific embodiments when read in connection  
10 with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

15 FIG. 1 is a perspective view showing a portion  
of an embodiment of the present invention.

FIG. 2 is a side view showing the contact parts  
of a switch embodied by the present invention.

20 FIG. 3 is a side view showing the contact parts  
of a further embodiment of the present invention

## DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 1 shows functional parts of the inventive multiple switch which is formed for example as a turning switch. A base plate is identified as a whole with reference numeral 1 and only a part of it is shown. A central contact 2 is arranged in the center of the base plate 1, and serves for example as an input fixed contact. Outer fixed contacts 3, 3a and 3b are arranged on the base plate 1 closer to its periphery. Contact bridges 4.1 and 4.2 with their contact rollers 4c roll on the fixed contacts 3a and 3b. Both contact bridges 4.1 and 4.2 are formed with rotation-symmetrical contact parts 4b. They are in contact with the central contact 2 at the opposite end of the contact bridges.

The contact bridges 4.1 and 4.2 are arranged on a driver 6 which is turnable in a switch housing relative to the base plate 1. The action of pressure springs 7.1 and 7.2, provides for the required contact pressure between each contact bridge 4.1 and 4.2 and the central contact 2 on the one hand and the fixed contacts 3a and 3b on the other hand. Each contact bridge 4.1 and 4.2 is individually guided on the driver 6. It has an axle 4a which is freely rotatable relative to the driver 6 and rolls with the rotation-symmetrical contact parts on their both ends both on the central contact 2 and also on the outer fixed contacts 3a and 3b.



1 As can be seen from FIGS. 1, 2 and 3, the contact parts  
are formed of one piece with the axle 4a of each contact  
bridge 4.1 and 4.2. The contact part 4b which rolls on the  
central contact 2 can be formed as a contact roller which is  
5 of one piece with the axle 4a. It can be also formed as a  
contact ball which due to the radial arrangement of the  
contact bridges 4.1 and 4.2 on the driver 6, and therefore  
short rolling path on the central contact 2 has a corre-  
spondingly smaller diameter of a smaller rolling periphery  
10 than the contact roller 4c which rolls on the farther  
outwardly located fixed contact 3a, 3b of each individual  
contact region 4.1, 4.2. As can be further seen from FIGS. 1  
and 2, each contact bridge 4.1 and 4.2, in addition to the  
contact roller 4c has a control part 4d which projects in  
15 direction of the longitudinal axis of the contact bridge  
radially outwardly. The control part 4d formed as control  
projection and for each switching step comes into contact with  
a control ramp 5 arranged radially outwardly of the fixed  
contact 3a, 3b. The control projection has a peripheral  
20 surface which produces a rubbing friction for turning of the  
contact bridge 4.1 and 4.2 about their longitudinal axis. For  
this purpose it is provided either with a roughening or a  
knurling or a suitable rubbing friction coating 4e.

25 Moreover, the contact rollers 4c have a conical or  
in some cases spherical outer periphery 4f as shown in FIG. 2.

1 Therefore with increasing contact burning on the periphery of the contact roller 4c, an axial burning displacement in direction of the longitudinal axis of the contact bridge 4.1 and 4.2 is produced.

5 Due to the roughening, knurling or the rubbing friction coating 4e on the control projection of each contact bridge 4.1 and 4.2, they are forcibly rotated with their outer contact rollers 4c when they come in engagement with the control ramp 5. Thereby the contact point on the periphery  
10 of the contact roller 4c is displaced with each switching step so that with increasing operational life of the switch the whole periphery of the contact roller 4c is gradually made available as contact points.

15 Instead of the control projection, the roughening, knurling or a friction coating can be performed as a control projection of the control part 4d and can be a part of the control roller 4c, when the control roller is fixedly connected either with the axle 4a or is freely rotatable on the axle 4a.

20 The multiple switch in accordance with the present invention can be formed as a turning switch or as a displacing switch with a linear movement.

25 It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of constructions differing

1 from the types described above.

While the invention has been illustrated and described as embodied in a multiple switch, it is not intended to be limited to the details shown, since various  
5 modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can, by applying current knowledge, readily adapt it for  
10 various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention.

What is claimed as new and desired to be protected  
15 by Letters Patent is set forth in the appended claims.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A multiple contact switch for a motor vehicle comprising;

a switch base;

5 a first fixed contact arranged on the switch base;

a second fixed contact arranged on the switch base radially outwardly from the first fixed contact;

a contact portion;

10 a bridge conductor having a contact surface for producing friction and a contact roller, the bridge conductor being in contact with the first fixed contact and arranged so that the contact roller can be brought into contact with the second fixed contact; and

15 a drive means for bringing the contact roller into contact with the second fixed contact and for bringing the contact surface of the bridge conductor into contact with the contact portion;

20 wherein the drive means is moveable with respect to the switch base and the friction is produced by the contact surface when the contact surface is brought into contact with the contact portion and the bridge conductor is driven over the <sup>contact</sup> ~~raised~~ portion by the drive means, and wherein the friction produced by the contact surface  
25 causes the contact roller of the bridge conductor to be rotated.

2. A multiple contact switch according to claim 1 wherein the drive means is rotatable about an axis of rotation and the bridge conductor is rotatable with  
30 respect to the drive means.

3. A multiple contact switch according to claim 1 or 2 further comprising pressing means for pressing an end portion of the bridge conductor against the first fixed contact and the contact roller of the bridge conductor against the second fixed contact.



4. A multiple contact switch according to claim 3 wherein the pressing means comprises a spring.

5 5. A multiple contact switch according to any one of claims 1 to 4 wherein the contact bridge has a projection which extends from the contact roller and wherein the contact surface is formed on the projection.

6. A multiple contact switch according to any one of claims 1 to 4 wherein the contact surface is formed on the contact roller.

10 7. A multiple contact switch according to any one of claims 1 to 6 wherein the contact surface is roughened.

8. A multiple contact switch according to any one of claims 1 to 7 wherein the contact surface is knurled.

15 9. A multiple contact switch according to any one of claims 1 to 6 wherein the contact surface is a coating for rubbing against the contact portion.

20 10. A multiple contact switch according to any one of claims 1 to 9 wherein the contact roller is conical in shape.

11. A multiple contact switch according to any one of claims 1 to 9 wherein the contact roller is spherical in shape.

25 12. A multiple contact switch according to any one of claims 1 to 11 comprising more than one said second fixed contact.

13. A multiple contact switch according to any one of claims 1 to 12 comprising more than one said bridge conductor.



14. A multiple contact switch according to claim 12 wherein the switch comprises more than one said bridge conductor, and wherein each said bridge conductor can be brought into contact with at least one of the second  
5 fixed contacts.

15. A multiple contact switch according to claim 3 wherein the end portion of the bridge conductor is a further contact roller.

16. A multiple contact switch according to any one  
10 of claims 1 to 15 wherein the <sup>contact</sup>~~raised~~ portion is a ramp which extends from the switch base.

17. A multiple contact switch substantially as hereinbefore described with reference to any one of the accompanying drawings.

15 Dated this 23rd day of June 1994  
MERIT-ELEKTRIK GmbH  
By their Patent Attorney  
GRIFFITH HACK & CO.



## ABSTRACT OF THE DISCLOSURE

A multiple switch, particularly for a motor vehicle, comprises a switch base, an input fixed contact arranged on the switch base, a plurality of output fixed contacts which can be connected with the input fixed contact, a ramp and a cooperating control part, control bridges controlled by the ramp and the cooperating control part and bringing the output fixed contacts in contact with the input fixed contact, a driver movable relative to the switch base and individually supporting and guiding the bridges, springs providing a required contact pressure between the contact bridges and the input fixed contact on the one hand and the contact bridges and the output fixed contacts on the other hand. Each of the contact bridges have axle which is freely rotatable relative to the driver and carries a contact roller. Each of the axles rolling with the contact roller on the output fixed contacts and directly cooperate through the control part with the ramp. One of the contact bridges and the contact roller is provided in the control part which comes into contact with the ramp with an initial surface which produces a rubbing friction for turning the one of the contact bridge and the contact roller about its longitudinal axis.

1/2





21268/92

2/2

FIG. 3

