

**FORM 2**  
THE PATENTS ACT, 1970  
(39 of 1970)  
&  
THE PATENTS RULES, 2003  
  
**COMPLETE SPECIFICATION**  
(See section 10 and rule 13)

**1. Title of the Invention**

A MECHANISM FOR ACTUATING A HANDLE LEVER OF THE DOOR OF A VEHICLE

**2. Applicant(s)**

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**3. Preamble to the description**

The following specification particularly describes the invention and the manner in which it is to be performed.

## **FIELD**

The present disclosure relates to vehicle door handle mechanisms. Particularly, the present disclosure relates to concealed vehicle door handle mechanisms.

## **BACKGROUND**

- 5 The background information herein below relates to the present disclosure but is not necessarily prior art.

Conventional door handles in vehicles protrude outside the body of the vehicle. The protruding door handles affect the aerodynamic performance. From the point of view of styling, the protruding door handles are not favoured. Different door handle  
10 designs and mechanisms have been envisaged to avoid the aerodynamic drag. One such mechanism has a flush door handle wherein the handle part of the mechanism is not protruding outside during the normal condition. When the key fob is operated, the door handle comes out of the door of the vehicle so that the user can pull to open the door.

- 15 However, the door handles of the prior art involve complex mechanisms and the handles is not easily operable under different circumstances.

There is, therefore, felt a need there for a simple and secured concealed door handle mechanism which alleviates the problems associated with the prior art.

## **OBJECTS**

- 20 Some of the objects of the present disclosure, which at least one embodiment herein satisfies, are as follows:

An object of the present invention is to provide a mechanism for actuating handle lever of a vehicle concealed inside the door of a vehicle.

Another object of the present invention is to provide a mechanism for actuating handle lever of a vehicle that is simple in construction.

Yet another object of the present invention is to provide a mechanism for actuating handle lever of a vehicle which is easily operable under different circumstances.

- 5 Still another object of the present invention is to provide a mechanism for actuating handle lever of a vehicle which is safe for the user.

Other objects and advantages of the present disclosure will be more apparent from the following description, which is not intended to limit the scope of the present disclosure.

10 **SUMMARY**

The present disclosure discloses a mechanism for actuating a handle lever of the door a vehicle. The mechanism is configured inside a housing defined in the panel of said door which comprises a cam pivotably mounted at one end of said housing, one end of said cam connected to said handle lever; a cam lever pivotably mounted in said housing and configured to be displaced by said cam; and a lock assembly mounted on one end of said housing, and said cam lever connected to said lock assembly for locking the door to the frame of the vehicle. The handle lever is configured to be displaced between a first operative position in which the lock assembly locks the door to the vehicle frame, a second operative position in which the lock assembly continues to lock the door to the frame but a user is able to grip the handle lever, and a third operative position in which the user is able to displace the handle lever to cause the lock assembly to unlock the door from the vehicle frame. The handle lever is then release from the third position upon which the handle lever returns to the first position.

- 25 An aspect of the present invention is that the hand lever is configured flush with the outside surface of the door in a closed position of said hand lever.

In a preferred embodiment, handle lever is pivotably secured inside said housing.

In a preferred embodiment, a torsion spring is disposed between said spring-loaded cam and said handle lever to bias said spring-loaded cam corresponding to closed position of said hand lever. Another torsion spring is provided on said lock.

- 5 In a preferred embodiment, a sensor is positioned on said handle lever to signal position of said hand lever and communicate to the infotainment system of the vehicle.

In another embodiment, a gripper is configured to extend from said handle lever to facilitate ease of manual grip, said gripper configured with finger grooves and  
10 contours.

In another embodiment, wherein a crowning geometry is defined extending from said gripper to facilitate prevention against entanglement of articles.

## **BRIEF DESCRIPTION OF THE ACCOMPANYING DRAWING**

The mechanism of the present disclosure will now be described with the help of the  
15 accompanying drawing, in which:

**Figure 1a** illustrates a mechanism for actuating a handle lever of the door of a vehicle of the present disclosure with the handle lever in a closed position;

**Figure 1b** illustrates a mechanism for actuating a handle lever of the door of a vehicle of the present disclosure with door handle in a partially-open position;

20 **Figure 2** illustrates a rear view of the mechanism for actuating a handle lever of the door of a vehicle of the present disclosure;

**Figure 3** illustrates an isometric view of the mechanism for a handle lever of the door of a vehicle of the present disclosure;

**Figure 4** illustrates a side view of the handle lever of Figure 3;

**Figure 5** illustrates a rear view of the mechanism within housing in a door panel of a vehicle;

**Figure 6** illustrates a front view of the handle mechanism within housing in a door panel of a vehicle;

#### **LIST OF REFERENCE NUMERALS**

100	mechanism
1	handle lever
2	cam
10	3 cam lever
4	pivot axis of spring-loaded cam
5	pivot axis of cam lever
6	pivot axis of handle
7	push lever
15	8 lock
9	housing
10	torsion spring for spring-loaded cam
11	outer cap
12	gripper
20	13 top surface

- 14 sensor
- 15 crowning geometry
- 16 torsional spring for lock

**DETAILED DESCRIPTION**

5 Embodiments, of the present disclosure, will now be described with reference to the accompanying drawing.

Embodiments are provided so as to thoroughly and fully convey the scope of the present disclosure to the person skilled in the art. Numerous details are set forth, relating to specific components, and methods, to provide a complete understanding of  
10 embodiments of the present disclosure. It will be apparent to the person skilled in the art that the details provided in the embodiments should not be construed to limit the scope of the present disclosure. In some embodiments, well-known processes, well-known apparatus structures, and well-known techniques are not described in detail.

The terminology used, in the present disclosure, is only for the purpose of explaining  
15 a particular embodiment and such terminology shall not be considered to limit the scope of the present disclosure. As used in the present disclosure, the forms “a”, “an” and “the” may be intended to include the plural forms as well, unless the context clearly suggests otherwise. The terms “comprises”, “comprising”, “including” and “having” are open-ended transitional phrases and therefore specify the presence of  
20 stated features, elements, modules, units and/or components, but do not forbid the presence or addition of one or more other features, elements, components, and/or groups thereof. The particular order of steps disclosed in the method and process of the present disclosure is not to be construed as necessarily requiring their performance as described or illustrated. It is also to be understood that additional or  
25 alternative steps may be employed.

When an element is referred to as being “mounted on”, “engaged to”, “connected to” or “coupled to” another element, it may be directly on, engaged, connected or coupled to the other element. As used herein, the term “and/or” includes any and all combinations of one or more of the associated listed elements.

- 5 Terms such as “inner”, “outer”, “beneath”, “below”, “lower”, “above”, “upper” and the like, may be used in the present disclosure to describe relationships between different elements as depicted from the figures.

A vehicle door handle mechanism with a concealed handle is required which is simple in construction, which is easy and safe to operate and which is easily operable  
10 under different conditions.

The present disclosure envisages a mechanism 100 for mechanically actuating a handle lever 1 concealed inside the door of a vehicle. The mechanism 100 of the present disclosure is explained here forth with the help of Figures 1-7.

The mechanism 100 comprises a handle lever 1 which is concealed inside a housing 9  
15 formed in the panel of the door. The mechanism 100 includes a lock assembly 8 and a plurality of elements configured to enable deployment of the handle lever 1 from a first operative position to an intermediate second operative position and finally to a third operative position. The first operative position corresponds to a position in which the lock assembly 8 locks the door to the vehicle frame. The second operative  
20 position corresponds to a position in which the lock assembly 8 continues to lock the door to the vehicle frame but a user is able to grip the handle lever 1. The third operative position corresponds to a position in which the user is able to displace the handle lever 1 to cause the lock assembly 8 to unlock the door from the vehicle frame. The handle lever 1 is then released from the third operative position to return  
25 the handle lever 1 to the first position. In an embodiment, the handle lever 1 is pivotable about an axis 6 to be angularly displaced.

In an embodiment, the mechanism 100 comprises a cam 2 that is mounted at one end of the housing 9. The handle lever 1 is in engagement with one end of the cam 2. A cam lever 3 is pivotably mounted in the housing 9 and configured to be displaced by the cam 2. The cam lever 3 is in engagement with the lock assembly 8 for locking the door to the frame of the vehicle. In an embodiment, a geometrical projection from the handle lever 1 is provided in the vicinity of the pivot axis 6 to be extending in the operative inward direction of the mechanism 100. The geometrical projection is engaged with the cam 2. A torsion spring 10 is provided for biasing the cam 2 towards a position corresponding to the first position of the handle lever 1. The lock assembly 8 supplies torque in a direction of opening of the handle lever 1 against the biasing torque of the spring 10.

According to a working configuration of the mechanism 100 of the present disclosure, when the handle lever 1 is in the first operative position, the face of the handle lever 1 is mechanically pushed inside by the user. The push is limited by the geometry which is inbuilt inside of the housing 9. This push translates the movement to the cam lever 3 and the cam lever 3 further translates this movement to the lock assembly 8. The lock assembly 8 releases the handle lever 1 to the second operative position mechanically.

The second operative position of the handle lever 1 in the housing 9 provides an access gap to the fingers to activate the handle lever 1 from the second operative position. The handle lever 1 is moved mechanically from the second operative position to the third operative position to completely unlock the door from the vehicle frame. The handle lever 1 is then released from the third operative position. Upon releasing, the handle lever 1 return to the first position and the door again gets locked by the lock assembly 8 to the vehicle frame.

According to an embodiment of the present disclosure, the handle lever 1 comprises two elements: an outer cap 11 and a gripper 12. The gripper 12 is enabled with finger



grooves or contours for comfortable and smooth access. The gripper 12 is provided with texture or grain for anti-slip. The handle lever 1 has a top surface 13 from the gripper 12 which restricts the complete grabbing of the handle lever 1 and protects the user's fingers with ring from getting caught between the handle lever 1 and the housing 9 formed within the door panel. When the handle lever 1 is in the partially-open position, the top surface 13 from the gripper 12 is partially enclosed between the gripper 12 and the housing 9.

In an embodiment, the handle lever 1 has a crowning geometry 15 extending from the front end of the gripper 12 to protect any loose items from getting caught within the housing 9.

The handle is equipped with at least one sensor 14 which provides a signal corresponding to the first operative position and the second operative position, and the signals are further configured to be transmitted in the form of audio or visual means in the vehicle infotainment system.

The foregoing description of the embodiments has been provided for purposes of illustration and not intended to limit the scope of the present disclosure. Individual components of a particular embodiment are generally not limited to that particular embodiment, but, are interchangeable. Such variations are not to be regarded as a departure from the present disclosure, and all such modifications are considered to be within the scope of the present disclosure.

## **TECHNICAL ADVANCEMENTS**

The present disclosure described herein above has several technical advantages including, but not limited to, the realization of a mechanism for actuating handle lever of a vehicle that is:

- simple in construction;

- easily operable under different circumstances;
- safe for the user; and
- equipped with a handle with a profile which avoids inadvertent hooking of the finger rings.

5 The foregoing disclosure has been described with reference to the accompanying embodiments which do not limit the scope and ambit of the disclosure. The description provided is purely by way of example and illustration.

The embodiments herein and the various features and advantageous details thereof are explained with reference to the non-limiting embodiments in the following  
10 description. Descriptions of well-known components and processing techniques are omitted so as to not unnecessarily obscure the embodiments herein.

The foregoing description of the specific embodiments so fully reveal the general nature of the embodiments herein that others can, by applying current knowledge, readily modify and/or adapt for various applications such specific embodiments  
15 without departing from the generic concept, and, therefore, such adaptations and modifications should and are intended to be comprehended within the meaning and range of equivalents of the disclosed embodiments. It is to be understood that the phraseology or terminology employed herein is for the purpose of description and not  
20 of limitation. Therefore, while the embodiments herein have been described in terms of preferred embodiments, those skilled in the art will recognize that the embodiments herein can be practiced with modification within the spirit and scope of the embodiments as described herein.

Throughout this specification the word “comprise”, or variations such as “comprises” or “comprising”, will be understood to imply the inclusion of a stated  
25 element, integer or step, or group of elements, integers or steps, but not the exclusion of any other element, integer or step, or group of elements, integers or steps.

The use of the expression “at least” or “at least one” suggests the use of one or more elements or ingredients or quantities, as the use may be in the embodiment of the disclosure to achieve one or more of the desired objects or results.

5 Any discussion of devices, articles or the like that has been included in this specification is solely for the purpose of providing a context for the disclosure. It is not to be taken as an admission that any or all of these matters form a part of the prior art base or were common general knowledge in the field relevant to the disclosure as it existed anywhere before the priority date of this application.

10 While considerable emphasis has been placed herein on the components and component parts of the preferred embodiments, it will be appreciated that many embodiments can be made and that many changes can be made in the preferred embodiments without departing from the principles of the disclosure. These and other changes in the preferred embodiment as well as other embodiments of the disclosure will be apparent to those skilled in the art from the disclosure herein, whereby it is to  
15 be distinctly understood that the foregoing descriptive matter is to be interpreted merely as illustrative of the disclosure and not as a limitation.

**We Claim :**

1. A mechanism (100) for actuating a handle lever (1) of the door a vehicle, said mechanism (100) configured inside a housing (9) defined in the panel of said door, said mechanism (100) comprising:
    - 5       • a cam (2) pivotably mounted at one end of said housing (9), one end of said cam (2) connected to said handle lever (1);
    - a cam lever (3) pivotably mounted in said housing (9) and configured to be displaced by said cam (2); and
    - 10       • a lock (8) assembly mounted on one end of said housing (9), and said cam lever (3) connected to said lock assembly (8) for locking the door to the frame of the vehicle;

said handle lever (1) configured to be displaced between : i) a first operative position in which the lock assembly (8) locks the door to the vehicle frame, ii) a second operative position in which the lock assembly (8) continues to lock the door to the frame; but a user is able to grip the handle lever (1); and

  - 15       iii) a third operative position in which the user is able to displace said handle lever (1) to cause said lock assembly (8) to unlock the door from the frame.
2. The mechanism (100) as claimed in claim 1, wherein said hand lever (1) is concealed inside the door in the first position of said hand lever (1).
  - 20   3. The mechanism (100) as claimed in claim 1, wherein said handle lever (1) is pivotably secured inside said housing (9).
  4. The mechanism (100) as claimed in claim 1, wherein a torsion spring (10) is disposed between said cam (2) and said handle lever (1) to bias said cam (2) to the first position of said hand lever (1).

5. The mechanism (100) as claimed in claim 1, wherein another torsion spring (16) is provided on said lock (8).
6. The mechanism (100) as claimed in claim 1, wherein a sensor (14) is positioned on said handle lever (1) to signal position of said hand lever (1) and communicate to the infotainment system of the vehicle.
7. The mechanism (100) as claimed in claim 1, wherein a gripper (12) is configured to extend from said handle lever (1) to facilitate ease of manual grip, said gripper (12) configured with finger grooves and contours.
8. The mechanism (100) as claimed in claim 1, wherein a crowning geometry (15) is defined extending from said gripper (12) to facilitate prevention against entanglement of articles.

Dated this 6<sup>th</sup> day of August, 2020



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## ABSTRACT

### A MECHANISM FOR ACTUATING A HANDLE LEVER OF THE DOOR OF A VEHICLE

The present invention discloses a mechanism (100) for actuating door handle lever (1) of a vehicle. The mechanism (100) is fitted inside a housing (9) defined in the outer panel of the door. The mechanism comprises a spring-loaded cam (2) pivotably mounted on the housing (9), one end of the spring-loaded cam (2) connected to the handle lever (1); a cam lever (3) pivotably mounted on the housing (9) and configured to be displaced by the spring-loaded cam (2); and a lock (8) mounted on the housing (9) and connected to the cam lever (3). The handle lever (1) is configured to be displaced into a second operative position in which the lock assembly continues to lock the door to the frame but a user is able to grip the handle lever. This facilitates ease of operation, improved aerodynamics and enhanced aesthetics.

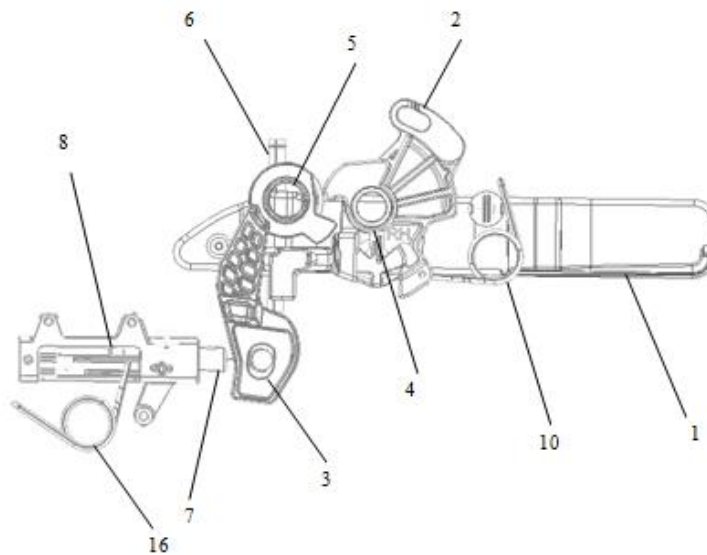


FIGURE 2