FTC 2021

Better – Simpler – More Ideal:

Disruptive Innovation by Patent Circumvention with Function Models from TRIZ

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System Evolution Example

"Disruptive Technology" turns the market upside-down.

DISRUPTION

?

"Sustaining Technology" high development effort to control it.

Pictures: Pixabay.

„Disruptive Innovation" coined by C. M. Christensen: „The Innovatior's Dilemma" (Harper, 2000).

What's the issue?

How to develop future concepts for disruptive innovation in a structured way?

By the application of well-suited method(s) such as TRIZ* based on patents and patterns!

*TRIZ = engl.: Theory of Inventive Problem Solving
russ.: Теория Решения Изобретательских Задач

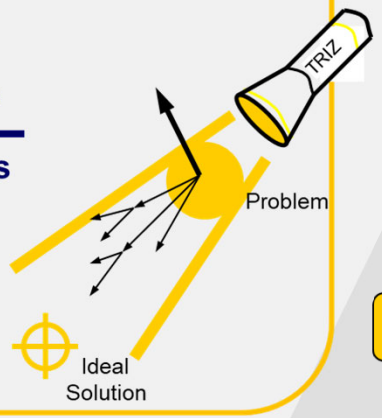
Outline

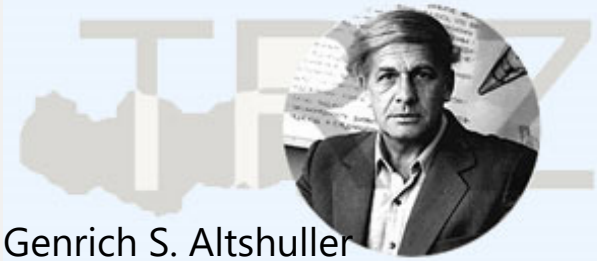
-> "Ideality" pattern in TRIZ
-> Function Models from TRIZ for visualization of prior art
-> Small case study for demonstration: Car windscreen wipers

TRIZ

The overall pattern:

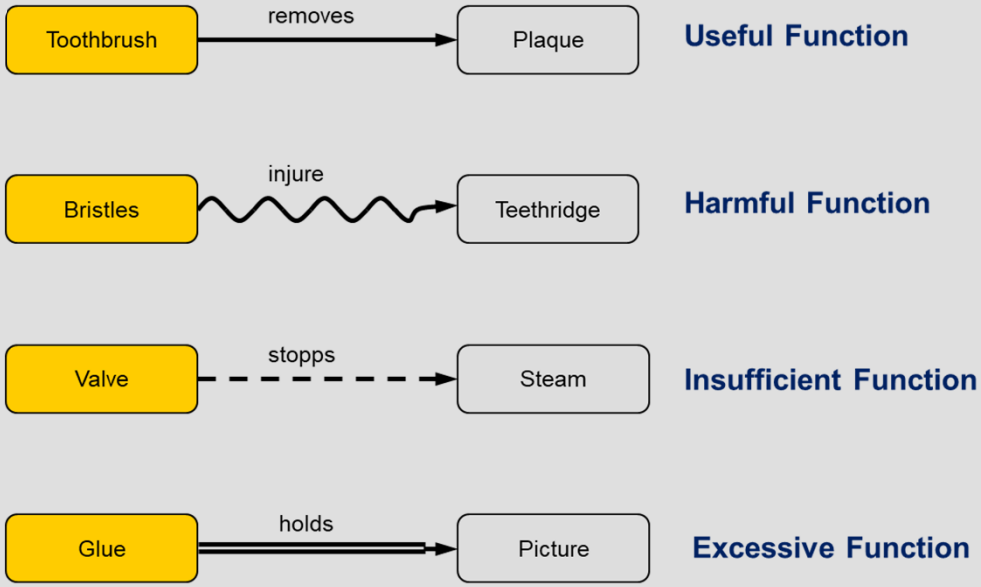
$$\text{Ideality} = \frac{\text{All } \textit{Useful} \text{ Functions}}{\text{All } \textit{Harmful} \text{ Functions}}$$





Genrich S. Altshuller
1929- 1998

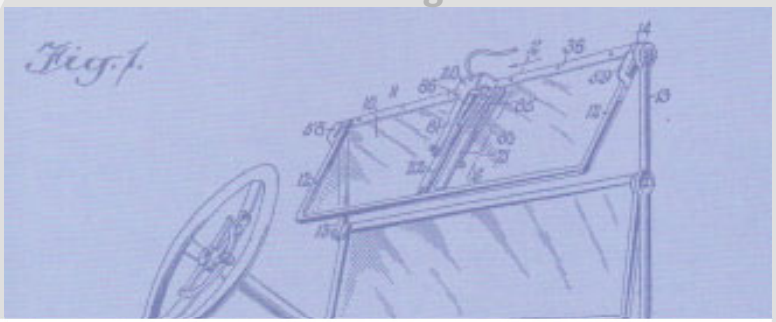
Functions remain, Systems disappear!

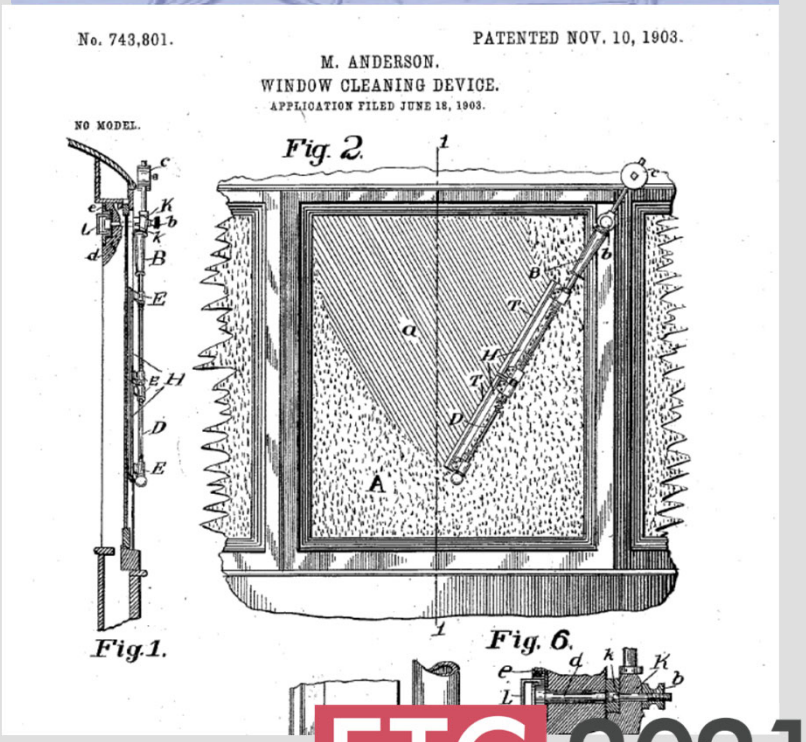


Acc. to:
Hentschel, C.; Gundlach, C; Nähler, H .T.: TRIZ – Innovation mit System. München: HANSER (2010); N.N.: VDI 4521 (2016 - 2021).

Mary Anderson (1866 – 1953), Patent No. US743 801 (1903)

„WINDOW-CLEANING DEVICE“





Source
Picture: M. Anderson and Fig.1 upper right: Sichtermann, Rose (ed. 2011)

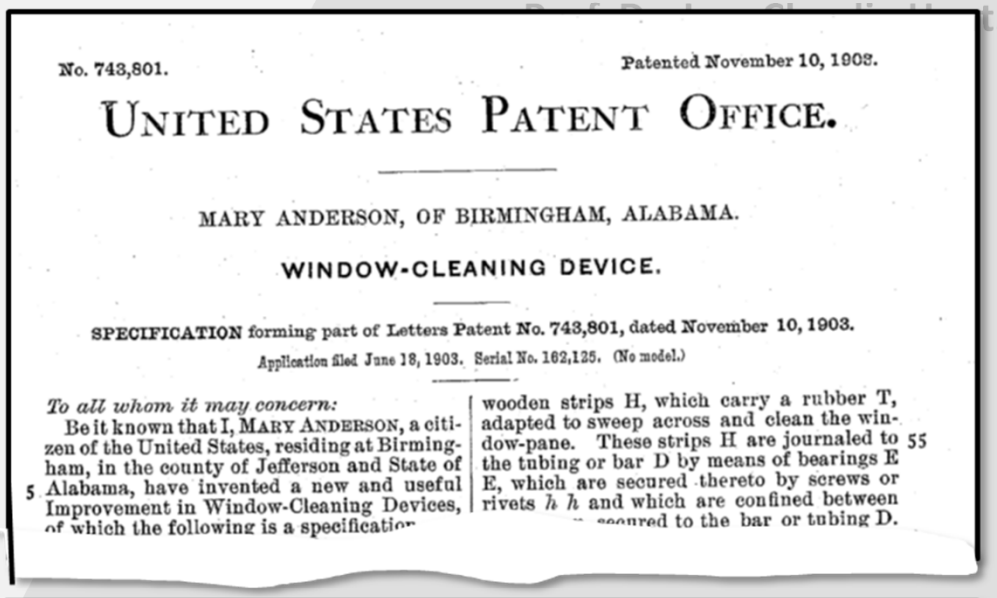
Source
Pictures lower right: original patent

A Case Study

Claim – The independent claim describes a windscreen wiper that consists of a spindle removeably secured (today: by a frame) to an arm with weight and cleaners (today: one rubber blade) at one end thereof.

Feature - The cleaners pivot to the main portion of the arm.
Function - Move Rain and dirt!

Elements – The spindle is journaled to a handle and means to swing the arm (today: motor and switch).
-> Set up the Function Model!



No. 743,801. Patented November 10, 1903.

UNITED STATES PATENT OFFICE.

MARY ANDERSON, OF BIRMINGHAM, ALABAMA.

WINDOW-CLEANING DEVICE.

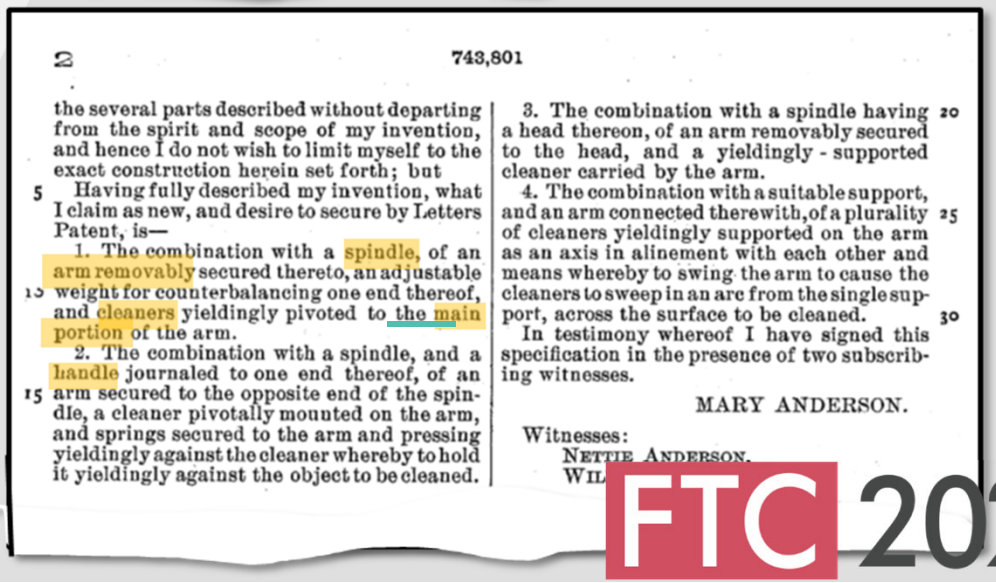
SPECIFICATION forming part of Letters Patent No. 743,801, dated November 10, 1903.

Application filed June 18, 1903. Serial No. 162,125. (No model.)

To all whom it may concern:

Be it known that I, MARY ANDERSON, a citizen of the United States, residing at Birmingham, in the county of Jefferson and State of Alabama, have invented a new and useful Improvement in Window-Cleaning Devices, of which the following is a specification:

wooden strips H, which carry a rubber T, adapted to sweep across and clean the window-pane. These strips H are journaled to the tubing or bar D by means of bearings E E, which are secured thereto by screws or rivets *h h* and which are confined between [illegible] secured to the bar or tubing D.



2 743,801

the several parts described without departing from the spirit and scope of my invention, and hence I do not wish to limit myself to the exact construction herein set forth; but

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination with a spindle, of an arm removably secured thereto, an adjustable weight for counterbalancing one end thereof, and cleaners yieldingly pivoted to the main portion of the arm.

2. The combination with a spindle, and a handle journaled to one end thereof, of an arm secured to the opposite end of the spindle, a cleaner pivotally mounted on the arm, and springs secured to the arm and pressing yieldingly against the cleaner whereby to hold it yieldingly against the object to be cleaned.

3. The combination with a spindle having a head thereon, of an arm removably secured to the head, and a yieldingly-supported cleaner carried by the arm.

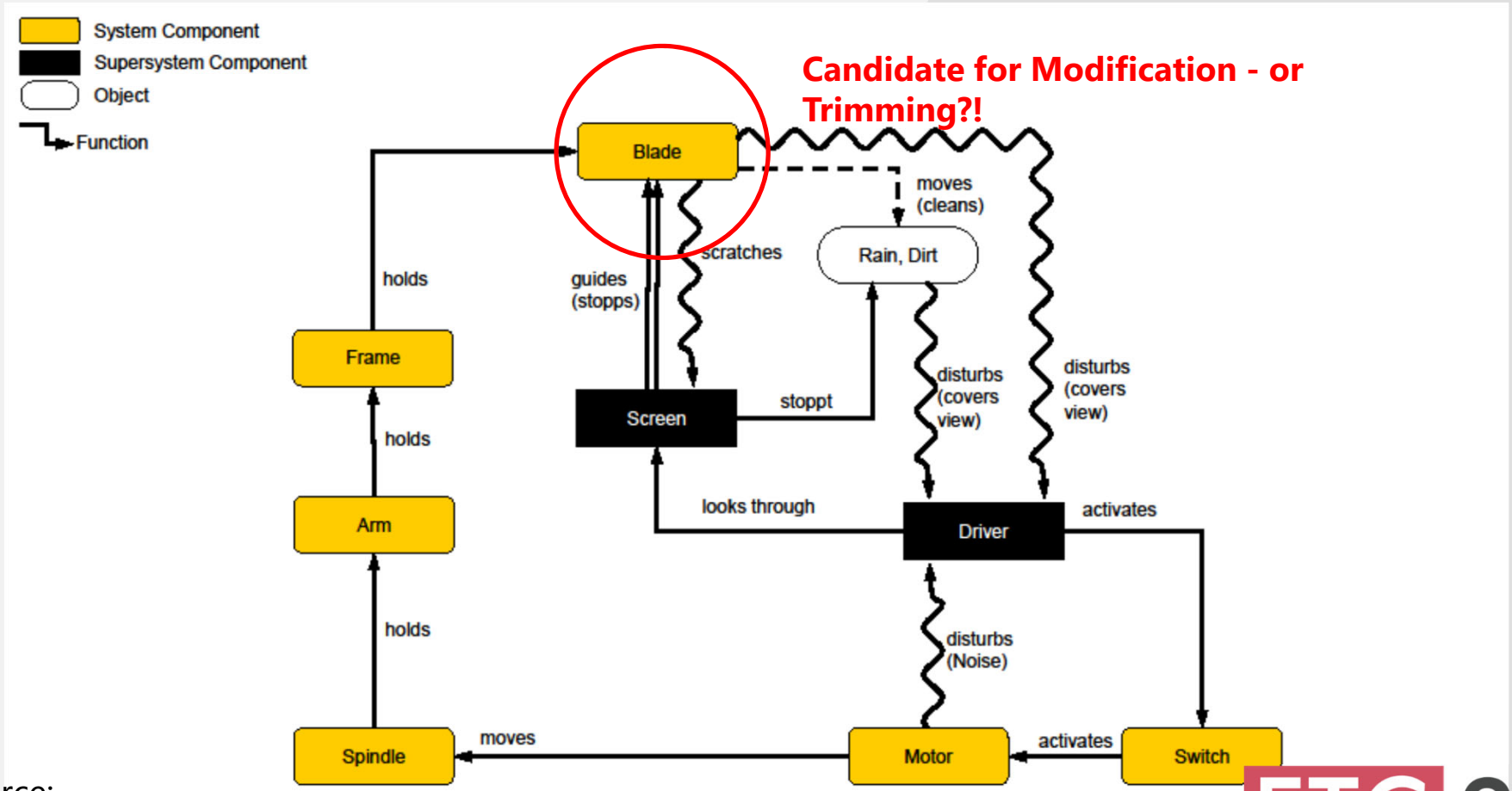
4. The combination with a suitable support, and an arm connected therewith, of a plurality of cleaners yieldingly supported on the arm as an axis in alinement with each other and means whereby to swing the arm to cause the cleaners to sweep in an arc from the single support, across the surface to be cleaned.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

MARY ANDERSON.

Witnesses:
NETTIE ANDERSON.
WIL[illegible]

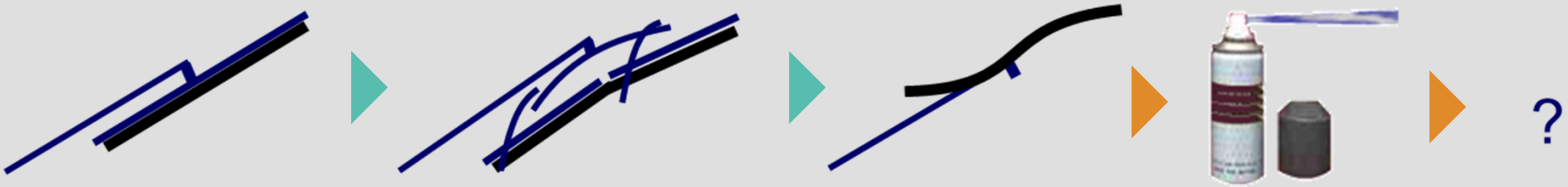
Function Model: Windscreen Wiper



Source:
The author.

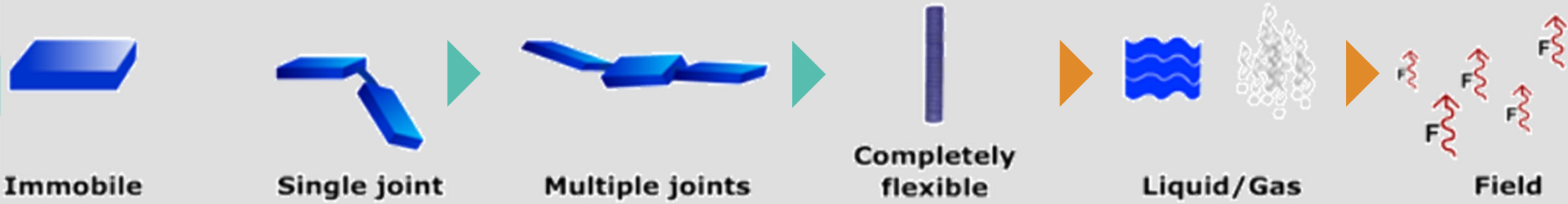
(Ideal) Evolution Pattern

Windscreen Wiper



Puch „Haflinger“ *more recent model* *VW Touran* *e.g. Aquapel*

Abstract Description of System Development in TRIZ



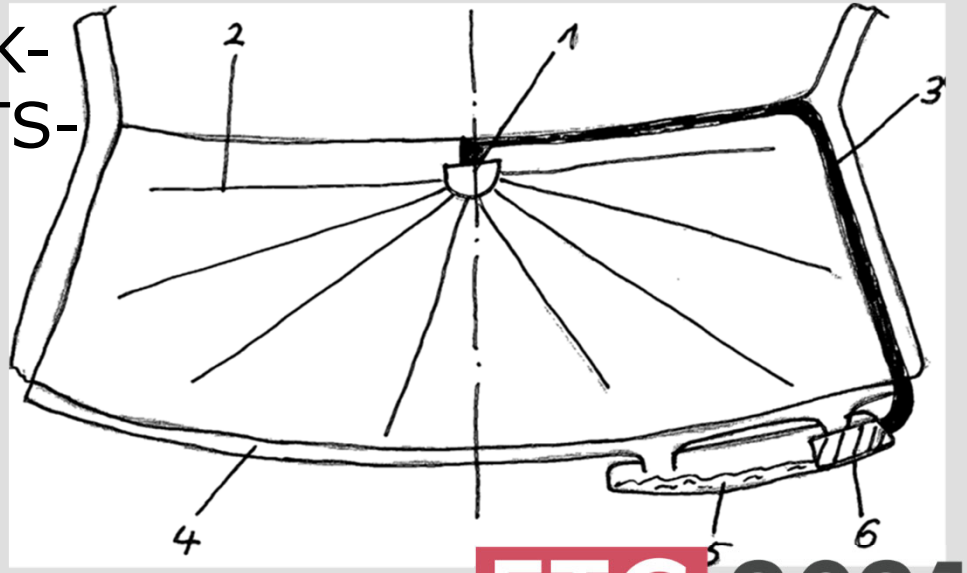
Immobile **Single joint** **Multiple joints** **Completely flexible** **Liquid/Gas** **Field**

Picture Sources
upper: c4pi Center for Product Innovation: http://c4pi.de/, last acc. Feb. 26th, 2020
lower: CREAX; Dewulf, S.: http://www.productioninspiration.com/, last acc. Feb. 26th, 2020.

N. Eckert‘s Invention (2016)
Patent No. DE 10 2013 005 676 B4

„ROTATIONS-SCHEIBEN-WISCHER MIT HOCHDRUCK-FLÜSSIGKEITS-STRAHL“

Rotary Windscreen Wiper with high-pressure liquid jet (translated by author)



Sources
Inventor ( ) with this paper’s author and her MA students; picture taken by author (2017
Right picture: taken from patent.

Tesla's Invention (2019)
Patent No. US 20190351873

„PULSED LASER CLEANING OF DEBRIS ACCUMULATED ON GLASS ARTICLES IN VEHICLES AND PHOTOVOLTAIC ASSEMBLIES"

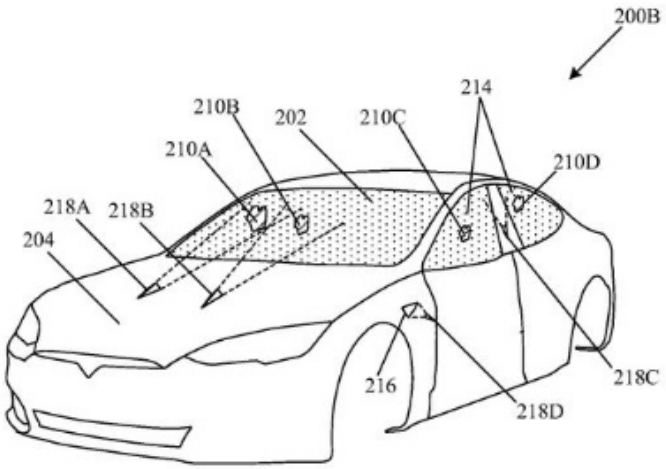


FIG. 2B

Sources
left picture: SPON 2019/12/18.
Right picture: taken from patent.

Conclusion: With TRIZ Function Models …

Simpler

… patent circumvention
using the semantics of prior art.

Better

… patent inspiration in a
structured way.

More Ideal

… perspective on the future
based on functions.

… towards Computer Aided Invention (CAI)

FTC

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THANK YOU! FTC 2021