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LONGITUDINAL AND TRANSVERSE GUIDANCE VIA THE STEERING WHEEL

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Technical task:
Today's driver-driven vehicles are usually equipped with a steering wheel, accelerator pedal and brake pedal to comfortably control the vehicle in longitudinal and transverse direction.
As the degree of automation of vehicles increases, it will become increasingly rare for the driver to control his vehicle directly. Car manufacturers are already turning their visions of purely autonomous vehicles into reality, with neither steering wheel nor pedals.
Until vehicles are able to independently find the way desired by the occupants in all situations, it is occasionally necessary to resort to manual control.
What they all have in common is that a braking or steering system does not require a direct connection to the driver. The control elements can therefore be designed and arranged more flexibly. Also, operating forces in such vehicles are no longer a criterion.

Initial situation:
Today's concept of the steering wheel, combined with accelerator and brake pedals, is not optimally suited for this. For optical reasons and to use the space freed up as interior space, the pedals and steering wheels have to disappear. Both controls must therefore be "disappearable".
There are also approaches to using a kind of joystick to carry out the control with one hand. This is not so easy and intuitive and must be practiced.

Solution:
The steering wheel is designed to be retractable and extendable. By turning the steering wheel, the vehicle is steered in transverse direction, to the left or right. The driver could accelerate by pulling the steering wheel towards him or decelerate or brake the vehicle by pushing it away.

The "steering column" is arranged in such a way that the retraction and extension mechanism can be used to detect the forward and backward movement of the steering wheel. Even a mechanical coupling of the steering wheel and/or the hydraulic coupling of the brake system could still be possible.

The first example shows a rocker construction combined with the possibility of adjusting the steering wheel in the direction of the steering axle. The example shows the variant with mechanical or hydraulic coupling. If the coupling is used, the parts can be displayed smaller and, if necessary, arranged differently.

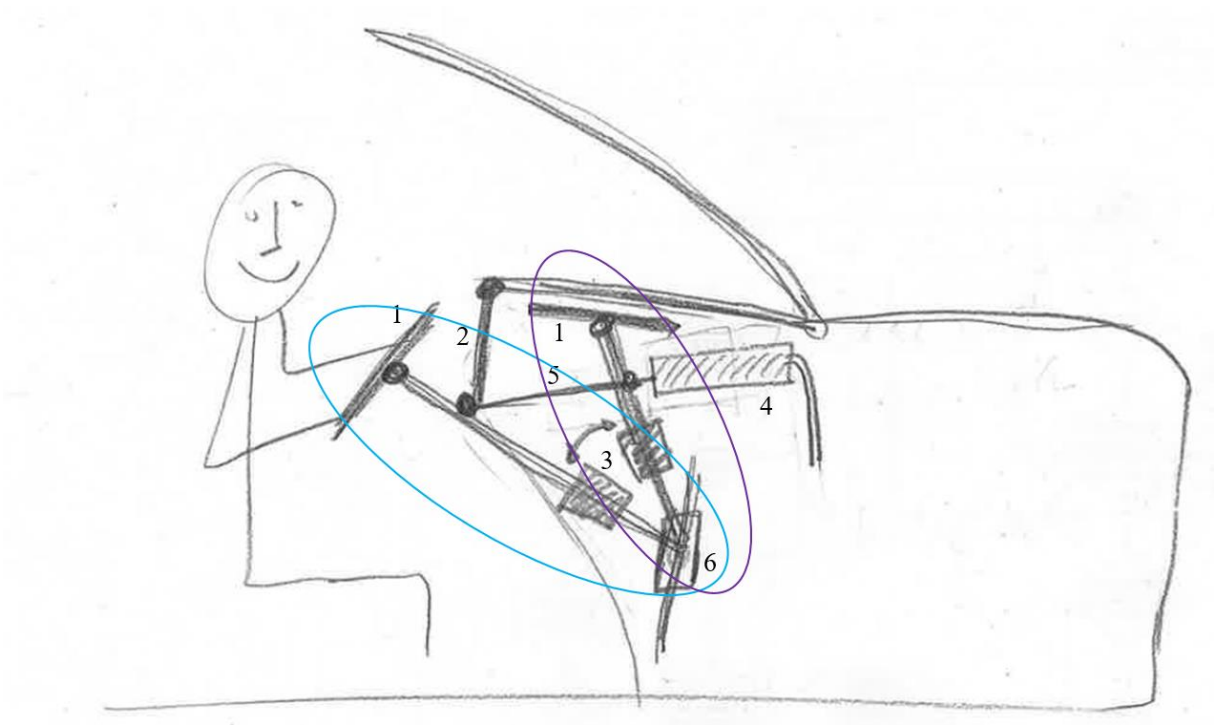

Figure 1

1. steering wheel (optional: foldable), may disappear under a screen when not in use
2. flap, roller shutter or the like which may cause the steering wheel to disappear
3. motor for retracting or extending the steering wheel to make it disappear (optional)
4. motor for the forward and backward swivelling of the "steering column" with simultaneous sensor to sense the forward and backward movements in the operating position. The rod used for swivelling can also be used as a push rod for a hydraulic brake cylinder. In this case, the motor could also be used as a brake booster.
5. connecting rod, cable or push rod
6. pivot point for pivoting the "steering column", also a "conventional" steering gear with superimposed steering and/or rotation angle sensor

Blue: Operating position. The driver can steer the vehicle.
Purple: Rest position. The steering wheel has "disappeared" or cannot be used for the driving task.

The second example shows a combined sliding construction (not shown: with adjustment possibility).
of the steering wheel) in the direction of the steering axle. Shown is the variant with a mechanical or hydraulic Coupling. If the coupling occurs, the parts can be displayed smaller and, if necessary, arranged differently.
The angle of the "steering column" to the vehicle allows the direction of actuation for acceleration or deceleration to be adjusted.

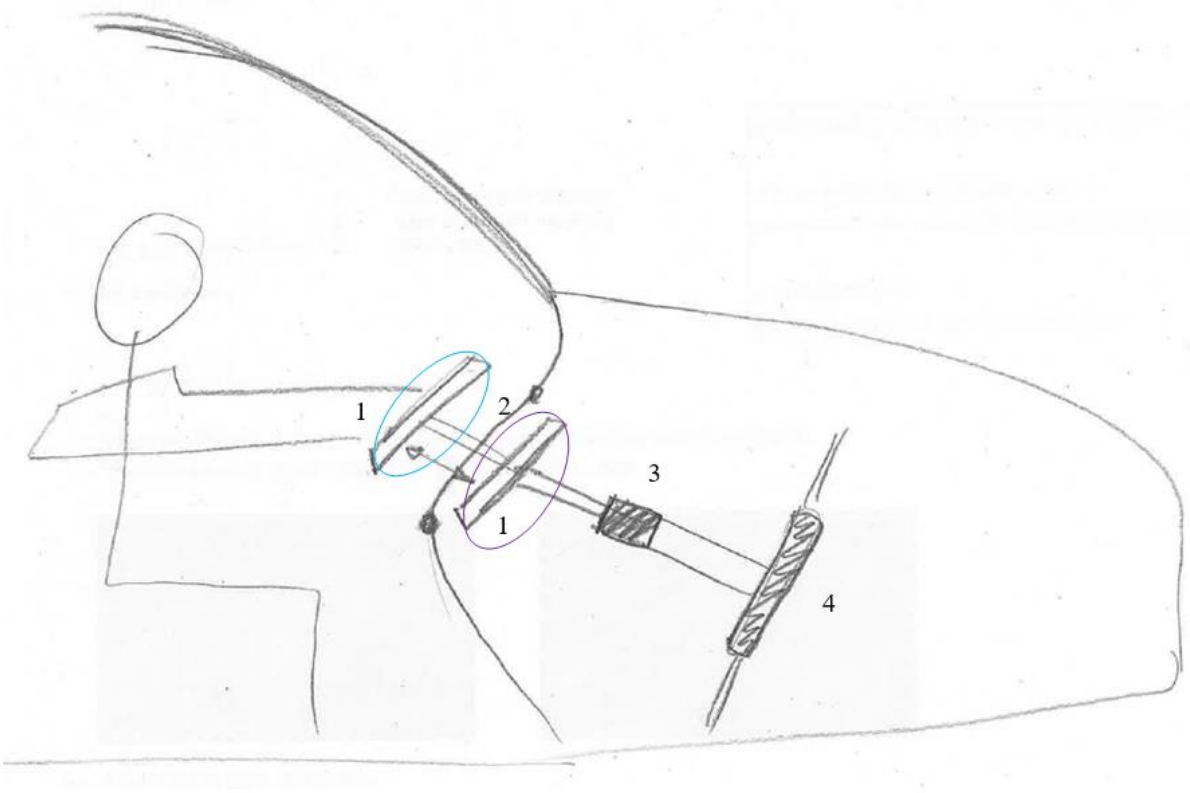

Figure 2

1. steering wheel (optional: foldable), may disappear under a screen when not in use
2. flap, roller shutter or the like which may cause the steering wheel to disappear
3. motor for retracting or extending the steering wheel to make it disappear (optional). The longitudinal movement could be used to operate a hydraulic cylinder. In this case, the motor could also be used as a brake booster.
4. "Conventional" steering gear with superimposed steering and/or angle of rotation sensor

Blue: Operating position. The driver can steer the vehicle.
Purple: Rest position. The steering wheel has "disappeared" or cannot be used for the driving task.

Advantages:
The retraction and extension mechanism can be used together. No "disappearable" foot lever mechanism has to be developed. This saves development and component costs.
In addition, the retraction and extension mechanism can, in addition to the "steering wheel disappears" function, also detect the forward and backward movement of the steering wheel for acceleration and deceleration if it is suitably arranged.

The combined operating option also gives people with disabilities who cannot move their legs the opportunity to steer the vehicle.
With a suitable design, even the mechanical coupling of brake and steering could be retained and the control could also be used in conventional vehicles. The distance to the driver can be easily adjusted by moving the steering wheel in and out without additional effort.