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DEVICE FOR LEAK TESTING COMPONENTS OF BATTERY HOUSINGS

Technical task:

The task of the technical innovation is to enable leak-proofing of components in battery cases early in the development process.

Initial situation:

In the automotive industry in general, battery-powered vehicles are currently being developed. In order to achieve the required ranges of 500km or more, the number of battery modules and thus the battery case are getting bigger and bigger and can therefore no longer be placed in the vehicle, but are mounted from the outside in the bottom of the vehicle. Thus, the battery sits outdoors and is thus exposed to all environmental influences. Due to these boundary conditions, high demands are placed on the tightness of the battery case. The tightness generally serves to prevent the ingress of moisture and thus to avoid short circuits, since they can ignite non-extinguishable fires.

Each individual bolted joint and gasket must be tightly sealed throughout the life cycle of the vehicle and the battery in all conditions defined in the specifications. Since in the development of such seal concepts up to series production the corresponding series components are usually available shortly before the production of customer vehicles, a testing of individual parts is indispensable for a statement regarding a conceptual suitability at an early stage and thus for replacement models. For this reason, test bodies were built for an upcoming production model, on which the corresponding components can be tested under the given boundary conditions under temperature and pressure. In these test specimens corresponding tests were from today's perspective, however, only „conditionally close“ feasible and thus not 100% safe.

In addition, tests on the complete battery housing for testing of individual components are very complex and also not effective because of the many potential interfaces, since you must always seal all other interfaces to determine a single to be tested sealing interface in order to get no interference.

The dimensions of a standard battery housing currently over 2m long and 1.6m wide requires a very large test tank and enormous heating power to apply the test temperature.

Solution:

The technical innovation describes the development of a new test body, which has a modular design. In it, various components and sealing concepts while respecting the geometric boundary conditions - as they occur in the later battery case - are taken into account.

Thus, a close-to-series testing of the individual parts can be carried out. As a result, a concept capability of a wide variety of components (screws, gaskets, sealing surfaces, etc.) in a very early stage of development is relatively fast and at the same time cost-optimized and still close to production possible.

This device has air connections, through which the pressure conditions (positive and negative pressure) in the battery housing can be mapped in real operation. The individual components are made of cathodic dip-coated aluminum and thus form the same surface conditions as in the series battery housing. The housing has eyelets and can be left in a heated, water-filled immersion tank, in which the temperature conditions are displayed in real operation. In addition, you can immediately detect any leaks in the water by rising air bubbles and determine by counting the air bubbles per unit time in the simplest way, a leak rate.

The picture shows the items of the device as an explosion model. Depending on the item to be tested, different tops and covers can be used.

Advantages:

- Early close-to-series tightness tests possible.
- Various test parameters possible.
- Long-term quality improvement and cost optimization.

Possible application:

- Battery electric vehicles with large high-voltage battery housings mounted outside the body.

Technische Neuerung

