Public Summary

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The use of lithium-ion batteries has increased exponentially over the years. They can be recharged and function better compared to other chargeable batteries, making them more efficient. There are, however, dangers that come along with these batteries. If they become damaged due to abuse or a manufacturing mistake, there is a high chance of them rapidly heating up. This could lead to them releasing toxic gasses and fires, and even explosions can occur.

Because of these dangers, the batteries must be appropriately and safely stored. This is where fire-resistant cabinets come in. They are designed in such a way that they prevent the fire from spreading anywhere outside of the cabinet. An extinguishing system is triggered when smoke is detected inside the cabinet, making sure the fire can not grow too big.

The problem lies in the fact that these cabinets only work when their doors are closed and locked. When the doors are still open, the fire and smoke can move outside of the cabinet, and it will take longer before they are detected. This means that even if the fire is extinguished, this will only be in the cabinet itself. There is a high chance that it has already spread beforehand.

While this is a well-known fact, there will always be a chance that the user of the cabinet forgets to close or lock the cabinet doors properly. Therefore, companies are busy with finding a solution that can close the doors automatically. There are existing door closers that do the job, but these specific cabinets have two doors that can only open and close in a particular order; the left door must be closed before the right door can close, meaning that regular closers will not work. This, combined with the wish for the system to be mechanical, meant that a new design had to be created.

This new design is a mechanism that can be placed on top of the cabinet or inside of the cabinet. Inside, it should still be located at the top side of the cabinet. The mechanism can be seen in figure 1, where each arm will be connected to one of the doors. This figure also shows the names of each component. The designed mechanism has the following results: The right door can be used freely if the left door is kept shut. Once the left door is opened, the right door will be prevented from moving until the left door is fully closed. Then, the right door is released and will fall shut too. The doors are pulled open by the user, and the design will pull them shut again once they are released.

To make sure this mechanism works, a prototype was created. By using laser cut, wooden components, a casing was assembled around the mechanism to make sure everything was kept in place and only moved in the correct directions. The prototype was evaluated to see if anything had to be adjusted within the design. This evaluation helped in improving the mechanism to create a final working design.

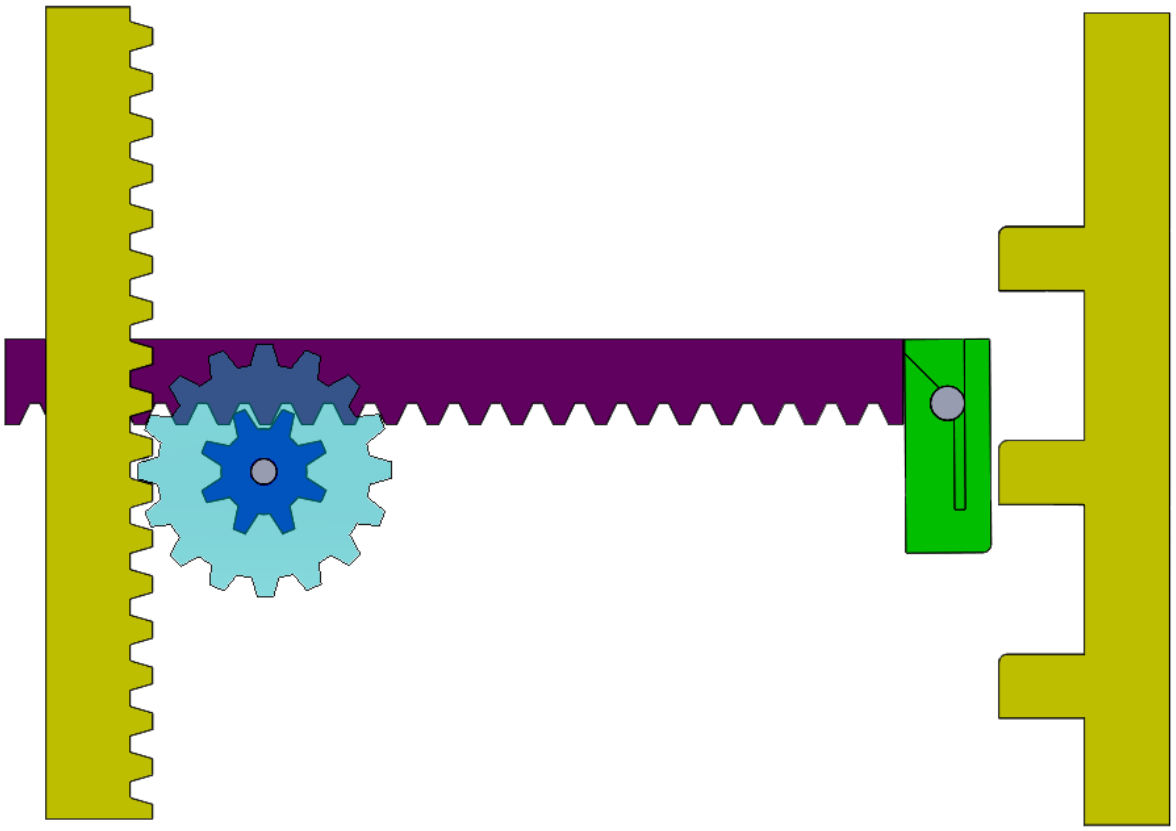

Figure 1. Mechanism