US PATENT PENDING

Torque Stabilized, Vortex Lifting System (TSVLS)

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1. Lift Rotor

- **Function**: The primary role of the lift rotor is to create rotational motion, which in turn generates lift. As the rotor spins, it induces airflow in the surrounding environment, resulting in a **downdraft** (air moving downward) underneath the rotor.
- **Interaction with Other Components**:
  - The lift rotor is rigidly attached to the motor via the center mount, allowing it to rotate with a controlled speed and force.
  - The **downdraft** produced by the spinning rotor generates a **vortex**—a swirling column of air—that moves downward and outward. This vortex interacts with the **main airfoils** and **stubby airfoils** to create horizontal lift and stabilize the system's torque.

2. Center Mount

- **Function**: The center mount serves as the structural anchor point for the rotor and connects it to the motor. It also allows the rotor to spin freely by providing a bearing system that supports the rotation while maintaining the rotor's alignment.
- **Interaction with Other Components**:
  - The center mount is connected to the motor at the center and to the shroud via the array of **main airfoils**. This allows the airfoils to act as a link between the rotor (and its downdraft) and the shroud.
  - The **airfoils** are rigidly fixed to the center mount on one end, which ensures that the main airfoils are held at a consistent position relative to the rotor. This setup helps direct airflow and utilizes the rotor's downdraft to generate horizontal lift.

3. Main Airfoils

- **Function**: The array of main airfoils, positioned around the circumference of the shroud, serves to convert the vortex in the rotor's downdraft into horizontal lift. The **leading edge** of the airfoils points upward, which optimizes their interaction with the downdraft and helps lift the system.
- **Interaction with Other Components**:
  - As the rotor creates a vortex in the downdraft, this vortex flows over and around the main airfoils. The **airfoils** convert the swirling air into horizontal lift by deflecting it at an angle.
  - This **horizontal lift** works to **counteract the torque** generated by the rotating lift rotor. In essence, the main airfoils generate a force in the opposite direction of the rotor's spin, stabilizing the system by reducing the net torque.

4. Shroud

- **Function**: The shroud is a surrounding structure that encloses the rotor and extends along the

length of the main airfoils. Its role is to direct airflow around the rotor and the airfoils and enhance the overall aerodynamic efficiency of the system. The shroud also helps shape the vortex generated by the rotor and ensures that it interacts effectively with the airfoils.

- **Interaction with Other Components**:
  - The **shroud** acts as a boundary that channels the airflow from the rotor and the vortex towards the main airfoils. Its shape and length influence the degree of vortex interaction with the airfoils, optimizing the horizontal lift generation.
  - The **main airfoils** are connected to the outer perimeter of the shroud, ensuring that they are positioned correctly in relation to the vortex generated by the rotor. The shroud serves as a stabilizing structure, helping to prevent any irregular or inefficient airflow patterns.

5. Stubby Adjustable Airfoils

- **Function**: These are shorter airfoils attached to the shroud. They have an adjustable angle of attack, meaning that their orientation can be modified to fine-tune the balance of horizontal lift and torque stabilization.
- **Interaction with Other Components**:
  - The **stubby airfoils** are positioned around the shroud, and their primary role is to provide **fine-tuning** of the anti-torque effect. When the system is in operation, the main airfoils generate horizontal lift that helps counteract the torque produced by the spinning rotor, but the torque can still be unbalanced due to various external factors (e.g., rotor speed or wind conditions).
  - The **adjustable angle of attack** of the stubby airfoils allows for precise control over the amount of lift generated by each airfoil. By changing the angle, these airfoils can either increase or decrease the horizontal lift in specific directions, ensuring that the system’s torque is perfectly balanced and stable.
  - The stubby airfoils provide **dynamic correction**: if torque becomes unbalanced (e.g., if the rotor's speed increases or if external forces apply), the stubby airfoils can be adjusted to counteract the discrepancy, stabilizing the system's behavior in real-time.

System Interaction Summary:

- The **rotor** generates a downdraft and vortex that flows around the main airfoils. These airfoils convert the vortex into horizontal lift, which counteracts the rotor's torque.
- The **main airfoils** direct the vortex to generate horizontal lift, helping stabilize the system against the torque of the spinning rotor.
- The **shroud** serves as a boundary and directs airflow around the rotor and airfoils, ensuring the vortex is utilized efficiently.
- The **stubby adjustable airfoils** fine-tune the balance of torque by adjusting their angle to modify the lift and counteract any residual or dynamic torque, ensuring the system operates smoothly and without destabilization.

By working together in this integrated way, these components allow the TSVLS to generate lift, stabilize torque, and provide precise control over the system's dynamics, all essential for stable operation in a variety of lifting applications.