Drive for a rotatable wing

The invention relates to a drive for a rotatable wing comprising an electric motor that is coupled via a gear to an output shaft which is coupleable to the wing.

Drives of this type are used, for example, to automatically move a wing in the form of a door or a window between a closed position and an open position; see, for example, DE 010 2006 002 751 A1, WO 2013/160087 A2, DE 10 2007 002 650 A1, and DE 103 36 075 B4. The drives described in these documents have an energy store that causes a wing that is in the open position to be moved into the closed position in the event of a power failure. The drive has quite a large volume due to providing this type of energy store.

Embodiments of the present invention provide a more compact drive for a rotatable wing.

Disclosed herein is a drive for a rotatable wing, in particular a door or a window, including: an electric motor, a gear, an output shaft which is coupled to the electric motor via the gear and is coupleable to the wing in order to move the wing back and forth between a closed position and an open position by means of the electric motor, and a force device for applying a force to the output shaft, which force generates a torque on the output shaft, which torque has a threshold value which is to be overcome in the currentless state of the electric motor in order to move the wing from the closed position to the open position and which torque vanishes in the open position of the wing.

According to an aspect of the present invention, there is provided a drive for a rotatable wing, including:an electric motor, a gear, an output shaft which is coupled to the electric motor via the gear and is coupleable to the wing in order to move the wing back and forth between a closed position and an open position by means of the electric motor, and a force device for applying a force to the output shaft, the force device having a spring situated transversely to the axis of the drive shaft of the electric motor and transversely to the axis of the output shaft.

In the drive according to the above disclosure, a force device is provided by means of which a closed wing is held in the closed position in the currentless state of the electric motor. The force device thus takes on a holding-closed function. In contrast, in the open position of the wing the force device has no effect, unlike the known drives, in which an open wing is moved into the closed position in the currentless state. The drive according to the above disclosure may thus have a more compact design.

A compact design of the drive is also achievable in that according to the above aspect the force device has a spring that is situated transversely to the axis of the drive shaft of the electric motor and transversely to the axis of the output shaft.

Additional specific design features and their advantages are apparent from the following description and drawings of exemplary embodiments, in which

Fig. 1 shows a first exemplary embodiment of a drive in a perspective view,

Claims

1. A drive for a rotatable wing (20), comprising:
- an electric motor (1),
- a gear (5),
- an output shaft (3) which is coupled to the electric motor via the gear and is coupleable to the wing in order to move the wing back and forth between a closed position and an open position by means of the electric motor, and
- a force device (10, 10', 11, 12, 13) for applying a force to the output shaft, the force device having a spring (13) situated transversely to the axis (1d) of the drive shaft (1b) of the electric motor and transversely to the axis (3b) of the output shaft.

2. The drive according to claim 1,
the force device (10, 10', 11, 12, 13) for applying the force generating a torque on the output shaft (3), which torque has a threshold value (Ms) which is to be overcome in the currentless state of the electric motor (1) in order to move the wing (20) from the closed position to the open position and which torque vanishes in the open position of the wing (20).

3. The drive according to claim 2, wherein the wing (20) is movable from the closed position via an intermediate position to the open position, and wherein the force device (10, 10', 11, 12, 13) is configured for exerting a torque (M) on the wing which vanishes or acts in the direction toward the open position when the wing is in the intermediate position.

4. The drive according to one of the preceding claims, wherein the force device (10, 10', 11, 12, 13) includes a cam gear (10, 10', 11, 12) that couples a, or the, spring (13) to the output shaft (3).

5. The drive according to one of the preceding claims, wherein the force device (10, 10', 11, 12, 13) includes a cam disk (10, 10') having at least one of the following features a through e:

a) the cam disk is rotatably fixedly connected to the output shaft (3),

b) the cam disk has a profile with a section (10d, 10d', 10g) that extends in a circle about the center of rotation (3b) of the cam disk,

c) the cam disk has a profile with an indentation (10b, 10b') that merges into a, or the, circular section (10d, 10d'),

d) the cam disk has a profile with an indentation (10b) that merges into a transition section (10f) that is adjoined by a, or the, circular section (10h), wherein the distance from the profile to the center of rotation of the cam disk decreases along the transition section,

e) the cam disk has a mirror-symmetrical profile.

6. The drive according to one of the preceding claims, wherein the force device (10, 10', 11, 12, 13) includes a pivot lever (12) having at least one of the following features a through f:

a) the pivot lever is situated in such a way that, viewed in the direction of the axis (3b) of the output shaft (3), the drive shaft (1b) of the electric motor (1) is situated on one side of the pivot lever, and the output shaft (3) is situated on the other side of the pivot lever,

b) the pivot lever is situated in such a way that, viewed transversely to the axis (3b) of the output shaft (3), it is situated between gear elements (5c, 5e) of the gear (5),

c) the pivot lever includes an actuating element (12e) for actuating a switch (15) as a function of the position of the pivot lever,

d) the pivot lever is pivotably supported on one end (12a), and with the other end (12c) acts on a, or the, spring (13) of the force device,

e) the pivot axis (12f) of the pivot lever is arranged parallel to the output shaft (3b),

f) a rotatable pressure roller (11) that contacts a, or the, cam disk (10) is situated on the pivot lever.

7. The drive according to one of the preceding claims, having an angle sensor (4, 4') by means of which the angular position of the axis of a gear element (5a-5e) of the gear (5) is detectable.

8. The drive according to claim 7, wherein the angle sensor (4) is coupled to a worm wheel (5a) of the gear (5), and/or has a magnet.

9. The drive according to one of the preceding claims, wherein the force device (10, 10', 11, 12, 13) includes a spring (13) having at least one of the following features a through c:

a) the spring has a linear characteristic curve in the working range,
b) the spring is designed as a compression spring or a disk spring,
c) the spring, viewed in the direction of the axis (3b) of the output shaft (3), is situated in such a way that the output shaft is situated between the spring and the drive shaft (1b) of the electric motor (1).

10. The drive according to one of the preceding claims,
which drive is for driving a door or a window.