

**Drive for a wing of a door or window and
production method for same**

5 The invention relates to a drive for a wing of a door or a window or the like, having a housing, at least one piston mounted in the housing, in particular a damping and/or spring piston, and a drive shaft which is mounted in the housing for rotation about an axis of rotation and couples the wing to the piston, wherein the drive shaft has at least one bearing part for mounting the shaft, and a transmission part,
10 in particular a pinion and/or cam disc, for transmitting movement of the shaft to the pistons, which are formed separately from one another, wherein the parts axially abut one another by an end-face contact contour.

A known, multi-part drive shaft comprises two bearing journals and a centre piece or transmission part, which can be designed, for example, as a pinion or cam con-
15 tour or cam disc. An extension is provided on the bearing journals and the centre piece and is used to weld the components to one another in a radially circumferential manner. To do so, laser welding is used in particular. The maximum weldable diameter or the diameter of the extension is determined by the deepest region of
20 the teeth or cam contour with respect to an axis of rotation. Since the teeth and cam contours often have very deep regions, the weldable diameter is sometimes very small.

Door closers are often subjected to a high torque, which a small extension or a
25 weld provided thereon may not be able to bear, which can cause the drive shaft to break.

Furthermore, the running surface of the bearing journal and/or a transmission re-
gion, in particular teeth or curve contour, of the transmission part often have to be

slightly shortened in order to create space for the laser beam, meaning that the running surface and the transmission region are not fused during welding.

5 An object of the invention is to improve the stability of the connection between the bearing part and the transmission part of the drive shaft in a drive of the type mentioned at the outset, in particular so that the drive shaft can withstand higher torques.

10 This object is achieved by a drive having the features mentioned in claim 1, and in particular in that the transmission part is welded to the bearing part in at least a first region of the contact contour, said first region having a greater radial height with respect to the axis of rotation than a minimum radial height of the transmission part with respect to the axis of rotation.

15 This provides a particularly large "welding diameter", i.e. the effective diameter of the welded connection. The welding diameter is not limited to the smallest radial height of the transmission part, but rather is larger to be able to improve the strength of the connection. This increases the permissible torsional moment of the welded connection and, as a result, the torsional strength and the stability of the
20 connection or the drive shaft.

It is often desirable or necessary for the transmission part to be made relatively small in some regions with respect to the axis of rotation, in particular radially smaller than a bearing surface of the bearing part and/or a contact portion of the
25 bearing part. It has now been recognised that it is not necessary to limit the weld to a circular contact contour within the smallest radial height of the transmission part. Rather, the entire radial height of the transmission part, in practice preferably at least a radial height greater than the smallest radial height of the transmission part, can theoretically be used for the welding in order to achieve a high torsional
30 moment of the welded connection. According to the invention, a complex trans-

mission part or a transmission part with a partly radially small structure and high stability can thus advantageously be interconnected in a particularly simple manner, namely by the increased welding diameter according to the invention. The transmission part can also be configured substantially independently of the bearing surface diameter of the bearing part, in particular with a radial height that is relatively small in some regions, whereas the bearing surface diameter can be chosen to be relatively large.

Due to the larger welding diameter and thus a larger welding surface area, the drive shaft can absorb significantly higher torques with otherwise identical dimensions. The larger welding diameter also advantageously means that the welding point is more accessible and in particular that a welding laser beam can be positioned more easily and can weld the components without colliding with a transmission region of the transmission part, in particular teeth or a cam contour, and/or a bearing surface of the bearing part.

Consequently, no or only a relatively small axial clearance has to be provided between the bearing surface and the transmission region for the welding point to be accessible. For example, the bearing surface and/or transmission region have been shortened axially to a relatively great extent. Owing to the invention, such a shortening is no longer necessary or is only necessary to a lesser extent, since the welding point can be arranged relatively far radially on the outside, i.e. it is particularly easily accessible. In other words, as a result of the invention, the functional regions of the shaft, i.e. in particular bearing surfaces and the transmission region, can advantageously be designed as required, with less axial space having to be provided for connecting the parts. As a result, bearing and transmission loads can be reduced and longevity can be improved.

According to one embodiment, the contact contour can be designed to be circular segment-shaped in the first region. As a result, the first region can be produced in

a particularly simple manner, for example by turning, a particularly uniform and thus sturdy welded connection being made possible.

5 For example, it can advantageously be provided that the radial height of the first region is smaller than the maximum radial height of the transmission part, in particular is the same height as or smaller than the radial height of the base of the interdental space in the first region, which has the smallest radial height.

10 The contact portion of the transmission part can, for example, have a circumferential contour in the shape of a circular segment in the first region of the contact contour. In particular, the circumferential contour in a second region can deviate from the circular shape of the first region, in particular can run completely radially within it.

15 Alternatively or additionally, the bearing portion of the bearing part can have, for example, a completely circular circumferential contour. A circular segment-shaped circumferential contour of the contact portion of the transmission part in the first region and a circular circumferential contour of the contact portion of the bearing part can preferably be arranged concentrically and/or have the same radius with
20 respect to the axis of rotation.

According to a further embodiment, it is provided that the transmission part is also welded to the bearing part in a second region of the contact contour, said second region having a smaller radial height than the first region, in particular wherein the
25 second region has a radial height which lies between the minimum radial height of the transmission part and the radial height of the first region.

The first and the second region of the contact contour can preferably together form the entire contact contour. In principle, a plurality of first and/or second regions can
30 also be provided.

According to an advantageous example, the contact portions of both the transmission part and the bearing part can have an at least substantially aligned outer surface in the first region of the contact contour. As a result, the stability of the welded connection can be further improved. In particular, the aligned outer surfaces can form a partial circular cylinder jacket in the first region.

According to an advantageous development, it is provided that the bearing part and the transmission part each abut one another over the entire surface.

The first region of the contact contour can advantageously comprise at least half, preferably at least two thirds, more preferably at least three quarters of the contact contour. Particularly good stability of the welded connection can thus be achieved.

The parts can also be advantageously welded by a plurality of welding spots along the contact contour and/or by at least one weld seam along the contact contour.

Furthermore, the parts can advantageously be welded along the entire contact contour by a seam and/or completely circumferentially. Particular stability is achieved in this way.

In one embodiment, the parts are welded by a butt seam, in particular in the first region and/or in the second region and/or in the region of aligned outer surfaces of the parts.

Alternatively or additionally, the parts can be welded by a fillet weld, in particular in the second region of the contact contour.

According to a further embodiment, it is provided that at least one of the parts has an axial projection for abutting the other part. This can facilitate access for a weld-

ing device. In addition, a distance of the weld to a functional region of the relevant part, such as a transmission region or a bearing surface, can be created in a particularly simple manner so that the welding process does not negatively influence this functional region.

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In an advantageous development, the projection is cylindrical, in particular having an at least partly circular cross section. In particular, a completely circular cylindrical projection can be provided on the bearing part.

10 For example, both parts can also have an axial projection and the projections can abut each other. The functional surfaces of the parts can thus be protected in a particularly simple and effective manner against excessive heat input during the welding process.

15 According to a further embodiment, it is provided that a weld point and/or a weld seam, in particular a fillet weld, in particular in the second region, is designed such that the contact contour is smoothed, in particular rounded. In general, it is preferred that no right angles are provided at the connection point, but instead in particular a rounding or chamfer. As a result, notch effects are greatly reduced and
 20 the strength is further improved. The effect of the seam elevation can advantageously be used to form the smoothing or rounding. This means that even without adding material, the welding point has a slightly larger volume than the connection partners in the fused region previously. By welding, therefore, in particular without adding material, an originally right angle of the connection partners can be
 25 smoothed or rounded, in particular without mechanical finishing, such as grinding or rolling. In addition, a free surface or a free portion between a circumferential contour of the transmission part or the contact contour and a circumferential contour of the bearing part in the contact region, in particular in the second region, can be fused during welding in order to provide material for the connection and
 30 smoothing.

The minimum radial height of the transmission part with respect to the axis of rotation can in particular be formed by the radially deepest region of a cam disc of the transmission part with respect to the axis of rotation and/or the base of an inter-
5 dental space of a pinion of the transmission part, or in each case by an axial extension thereof, for example in an axial projection. The second region can be formed, for example, by at least one interdental space. In the case of a pinion, an entire tooth or a plurality of teeth can also be part of the second region, for example.

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The parts can preferably be welded to one another by means of laser welding. With the large welding diameter according to the invention, this allows for a particularly sturdy connection.

15 A second, separately shaped bearing part can also be provided which is welded to the transmission part on the side facing away from the first bearing part. In particular, a connection can be provided between the second bearing part and the transmission part which corresponds to the connection between the first bearing part and the transmission part.

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For example, a contact surface can be formed between the bearing part and the transmission part, delimited in particular by the contact contour. The contact surface can advantageously be oriented perpendicularly to an axis of rotation of the drive shaft. In principle, the contact surface can be planar, for example. Alterna-
25 tively, the contact surface can be conical, for example. The contact surface can in principle also be hollowed out on the inside, for example in the case of a hollow shaft, and can in this case in particular be an annular surface. For example, a protrusion can also be provided on one part within the contact surface and a corresponding recess can be provided on the other part, for centring and/or positioning
30 the parts relative to one another.

The object is further achieved by a production method according to the independent claim directed thereto. In this method, a drive shaft is formed by at least one bearing part and a separate transmission part, wherein the parts are brought into axial abutment with one another by a contact contour, and wherein the transmission part is welded to the bearing part in at least a first region of the contact contour, said first region having a greater radial height with respect to the axis of rotation than a minimum radial height of the transmission part. For this purpose, the components can be pre-assembled or pre-positioned, for example using a pin and a corresponding bore.

All of the embodiments described in connection with the drive can be used accordingly to further develop the method and vice versa.

The invention is explained in greater detail below merely by way of example with reference to the schematic drawings.

Fig. 1 shows a drive shaft.

Fig. 2 is an enlarged, perspective view of the drive shaft of Fig. 1.

Fig. 3 shows a pinion.

Fig. 4 shows a cam disc.

Fig. 5 shows a drive shaft according to the invention.

Fig. 6 is an enlarged, perspective view of the drive shaft of Fig. 5.

Fig. 7 shows a pinion according to the invention.

Fig. 8 shows a cam disc according to the invention.

Fig. 9 is a view of the drive shaft of Fig. 5 that has been further enlarged and is seen from a different perspective compared with Fig. 6.

Fig. 10 shows a welded contact contour of the drive shaft of Fig. 5.

Fig. 11 shows a welded contact contour of a further drive shaft according to the invention comprising a cam disc.

Fig. 1 to 4 show a drive shaft or transmission parts which are not designed according to the invention and are used to explain the technical background of the invention. Nevertheless, individual features shown therein can be used to further develop the invention.

Fig. 1 shows a drive shaft 20 which comprises a first bearing part 22, a second bearing part 24 and a transmission part 26 arranged between them. The bearing parts 22 and 24 and the transmission part 26 are formed separately from one another, abut one another by respective axial projections 28 and 30, and are circumferentially welded there. This can be done in particular by means of a welding laser beam 32.

The transmission part 26 is designed as a pinion and comprises a plurality of teeth 34 arranged distributed over the circumference. As can be seen in Fig. 2, these teeth 34 have a different height with respect to an axis of rotation of the drive shaft 20. The radial height of the transmission part 26 is smaller than the radial height of a bearing surface 38 of the bearing part 22 at least in a region of an interdental

space. This also applies in comparison with the bearing part 24, although this cannot be seen in Fig. 2.

5 The transmission part 26 abuts the bearing part 22 by a contact contour 40. The parts are welded to one another along the contact contour 40. The radius of the projections 28 and 30 or a weld seam produced by the laser beam 32 along the contact contour 40 is smaller than the smallest radial height of the transmission part 26, said height being determined here by the base 36 of an interdental space.

10 In Fig. 3, the pinion 26 is shown separately and in an axial top view of its projection 30. An axis of rotation 41 is also shown, which runs perpendicular to the image plane of Fig. 3. The radial height of the projection 30 with respect to the axis of rotation 41, said height corresponding to the radial height of the contact contour 40, is selected to be less than or at most as large as the smallest radial height of the transmission part 26 (that of the interdental space base 36 in this case).

Fig. 4 is a perspective view corresponding to Fig. 3 of a transmission part 42 designed as a cam disc, likewise having a projection 30. Here too, the radial height of the projection 30 is selected such that a radially smallest region of the transmission part 42 (a radially smallest region 44 of the contour of the cam disc 42 in this case) has the same or a greater axial height. The projection 30 is thus arranged entirely within the contour of a transmission region of the transmission part.

25 An embodiment of a drive shaft according to the invention is described below. The reference numerals are used for better orientation in accordance with the above statements.

Fig. 5 shows a drive shaft 20 according to the invention comprising a first bearing part 22, a second bearing part 24 and a transmission part 26. The parts are

formed separately from one another, axially abut one another and are welded together.

Fig. 6 is an enlarged, perspective view of a contact region between the bearing
 5 part 22 and the transmission part 26. A welding laser beam 32 is shown as it welds the parts 22 and 26 together.

The bearing part 22 and the transmission part 26 axially abut one another by respective projections 28 and 30. Two bases 36 of respective interdental spaces are
 10 radially smaller than the radial height or diameter of both the projection 30 in the first region and the completely circular cylindrical projection 28.

Fig. 7 is an axial top view of the transmission part 26 separately. As can be clearly seen here, the two bases 36 of the interdental spaces are designed to be radially
 15 smaller than a radially larger, circular segment-shaped circumferential region of the projection 30, which forms a first region 45 of the contact contour 40. In fact, even a tooth 34 is completely radially smaller than the circular segment-shaped circumferential region or the first region 45. The radial height of the first region 45 is smaller than the maximum radial height of the transmission part 26 (defined in
 20 this case by the furthest tooth to the right in Fig. 7), in particular is the same size as or smaller than the radial height of the base 36 of the interdental space in the first region 45, which has the smallest radial height.

In the first region 45 the circumferential contours of the projections 28 and 30 correspond to one another, and the parts 22 and 26 or the projections 28 and 30 have
 25 aligned outer surfaces in the first region 45. In this example embodiment, the projection 28 is designed as a complete circular cylinder, i.e. it has a completely circular cross section and a completely circular circumferential contour. As can be clearly seen in Fig. 7, however, the interdental spaces and the tooth 34 deviate
 30 inwards from the corresponding circular shape, namely in a second region 46 of

the contact contour 40. The projection 30 is thus designed only as a partly circular cylinder.

Fig. 8 shows a transmission part, which is designed as a cam disc 42 and can be provided, for example, in a drive shaft according to Fig. 5 instead of the transmission part 26. As a transmission region, the cam disc 42 comprises a curved surface which is variable in terms of its radial height over the circumference.

A projection 30 is largely circular cylindrical, and specifically concentric with the axis of rotation 41. A radially smallest region 44 of the cam disc 42 with respect to the axis of rotation 41 can be seen on the left in Fig. 8. This region 44 has a radial height which is smaller than the radial height of the circular first region 45 of the contact contour 40 or of the projection 30.

The bearing parts 22 and 24 and the transmission parts 26 and 42 described here all have axial projections 28 and 30 for mutual, axial abutment. However, these are not absolutely necessary. In principle, either projections can also be provided only on one side or no projections at all can be provided between the connection partners. Nevertheless, such projections can bring about an advantageous clearance from functional surfaces of the bearing parts or transmission part.

In Fig. 9, the contact region between the bearing part 22 and the transmission part 26 is further enlarged and is shown from a slightly different perspective from that of Fig. 6. The contact contour 40 is indicated by a first region 45 and a second region 46 between the connection partners. The bearing part 22 and the transmission part 26 each abut one another by opposite end faces. Fig. 9 particularly clearly shows, in particular in conjunction with Fig. 7, that the first region 45 of the contact contour 40 has a greater radial height with respect to the axis of rotation 41 than a minimum radial height of the transmission part 26 with respect to the axis of

rotation 41. The transmission part 26 is welded to the bearing part 22 at least in the first region 45, but advantageously also in the second region 46.

5 The contact contour 40 is designed in the form of a circular segment, namely circular in the first region 45 and a different shape from that of the first region 45 in the second region 46. In the second region 46, the contact contour 40 is designed such that it corresponds to the contour of a transmission region of the transmission part 26 (in this case the contour of the corresponding interdental spaces or of the tooth 34 of the transmission part 26).

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The projection 28 on the bearing part 22 is completely circular cylindrical. Between the circular circumferential contour of the projection 28 and the circumferential contour of the projection 30 or the contact contour 40 in the second region 46, there is a free surface 50 of the end face of the projection 28 or of the bearing part 15 22. A right angle is formed between the free surface 50 and the tooth contour in the second region 46. In this example, the end face of the projection 28 is aligned perpendicularly to the axis of rotation 41 and the tooth contour runs completely axially.

20 The bearing part 22 and the transmission part 26 can preferably be welded at a plurality of welding spots along the contact contour 40 or by means of a weld seam which runs along the entire contact contour 40. In the first region 45 and/or in the second region of the contact contour 40 or in the region of aligned outer surfaces of the projections 28 and 30, a butt seam is preferably provided between the parts. 25 In contrast, a fillet weld is preferably provided in the second region 46 of the contact contour. The welding spots and/or weld seams are preferably produced by means of laser welding, in particular without adding material.

Fig. 10 is a perspective view of the drive shaft 20 similar to Fig. 9, but the parts 22, 30 26 are welded, specifically by a weld seam 52. In this embodiment, said seam ex-

tends along the entire contact contour 40; it is designed as a butt seam in the first region 45 and as a fillet seam in the second region 46.

The contact contour 40 is smoothed and rounded in the second region 46 in comparison with the right angle between the tooth contour and the free surface 50 described with reference to Fig. 9. In this region, the weld seam 52 has in particular a concave structure. This can be introduced, for example, by advantageously utilizing the effect of the seam elevation. The free surface 50 can also be fused during the welding process in order to provide additional material for the weld seam 52 or for smoothing or rounding. Due to the smoothing and/or rounding, there is therefore no longer a right angle between the tooth contour and the free surface 50 or between the transmission part 26 and the bearing part 22, and so an associated notch effect is avoided or reduced. The welded connection therefore has particularly high stability.

Fig. 11 shows a view corresponding to Fig. 10 for a drive shaft comprising a transmission part designed as a cam disc 42. Here, too, a free surface 50 and a weld seam 52, which smooths the contact contour in the second region, are visible. The second region is defined here by a radially smallest region 44 of the cam disc 42. Here, too, the seam 52 reduces the notch effect and ensures good stability of the welded connection.

As can already be seen from a comparison of Fig. 1 and 5, the drive shaft of Fig. 5 has a significantly larger welding diameter in the contact or connection region between the bearing parts 22 and 24 and the transmission part 26. In the second region of the contact contour, the radial height of the welding points or weld seam is small in some regions compared with the greatest radial height of the contact contour, so in this example in comparison with the radius of the first region of the contact contour. Nevertheless, the large radius or diameter of the weld in the first region has a particularly positive effect on stability. In addition, in this case use is

advantageously made of the fact that the torsional moment of the weld seam increases substantially in the fourth power with the radius. This means that even if the second region of the contact contour is a slight weak point compared with the first region, the increase of the radius in the first region compared with the drive shaft of Fig. 1 has a considerably positive effect on the stability of the welded connection. Against this background, it is particularly advantageous if the first region of the contact contour or a weld seam provided there extends over at least half, in particular at least three quarters, of the circumference.

List of reference signs

	20	Drive shaft
5	22	First bearing part
	24	Second bearing part
	26	Transmission part
	28	Projection
	30	Projection
10	32	Welding laser beam
	34	Tooth
	36	Base of an interdental space
	38	Bearing surface
	40	Contact contour
15	41	Axis of rotation
	42	Cam disc
	44	Radially smallest region
	45	First region
	46	Second region
20	50	Free surface
	52	Weld seam

Claims

- 5 1. A drive for a wing of a door or a window or the like, having
a housing,
at least one piston mounted in the housing, in particular a damping and/or
spring piston, and
a drive shaft (20) which is mounted in the housing for rotation about an axis
10 of rotation (41) and couples the wing to the piston,
wherein the drive shaft (20) has at least one bearing part (22, 24) for mount-
ing the shaft (20), and a transmission part (26, 42), in particular a pinion
and/or cam disc, for transmitting movement of the shaft (20) to the pistons,
which are formed separately from one another,
15 wherein the parts (22, 24, 26) axially abut one another by an end-face con-
tact contour (40),
characterised in that
the transmission part (26, 42) is welded to the bearing part (22, 24) in at
least one first region (45) of the contact contour (40), said first region having
20 a greater radial height with respect to the axis of rotation (41) than a mini-
mum radial height of the transmission part (26, 42) with respect to the axis
of rotation (41).
- 25 2. The drive according to claim 1,
characterised in that
the contact contour (40) is circular segment-shaped in the first region (45).
- 30 3. The drive according to claim 1 or 2,
characterised in that
the radial height of the first region (45) is smaller than the maximum radial

height of the transmission part (26, 42), in particular is the same height as or smaller than the radial height of the base (36) of the interdental space in the first region (45), which has the smallest radial height.

5 4. The drive according to any one of the preceding claims,
characterised in that
the contact portion of the transmission part (26, 42) in the first region (45) of
the contact contour (40) has a circular segment-shaped circumferential con-
tour.

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5. The drive according to any one of the preceding claims,
characterised in that
the bearing portion of the bearing part (22, 24) has a completely circular cir-
cumferential contour.

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6. The drive according to any one of the preceding claims,
characterised in that
the transmission part (26, 42) is also welded to the bearing part (22, 24) in a
second region (46) of the contact contour (40), said second region having a
smaller radial height than the first region (45), in particular wherein the sec-
ond region (46) has a radial height which lies between the minimum radial
height of the transmission part (26, 42) and the radial height of the first re-
gion (45).

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25 7. The drive according to claim 6,
characterised in that
the first and the second region (45, 46) of the contact contour (40) together
form the entire contact contour (40).

8. The drive according to any one of the preceding claims,
characterised in that
the contact portions of the transmission part (26, 42) and of the bearing part
(22, 24) have an at least substantially aligned outer surface in the first re-
5 gion (45) of the contact contour (40).
9. The drive according to any one of the preceding claims,
characterised in that
the bearing part (22, 24) and the transmission part (26, 42) each abut one
10 another over the entire surface.
10. The drive according to any one of the preceding claims,
characterised in that,
the first region (45) of the contact contour (40) comprises at least half, pref-
15 erably at least two thirds, more preferably at least three quarters of the con-
tact contour.
11. The drive according to any one of the preceding claims,
characterised in that
20 the parts (22, 24, 26, 42) are welded by a plurality of welding spots along
the contact contour (40) and/or by at least one weld seam (52) along the
contact contour (40).
12. The drive according to any one of the preceding claims,
25 characterised in that
the parts (22, 24, 26, 42) are welded along the entire contact contour (40)
by a seam (52).
13. The drive according to any one of the preceding claims,
30 characterised in that

the parts (22, 24, 26, 42) are welded by a butt weld, in particular in the first region (45) and/or in the second region (46) and/or in the region of aligned outer surfaces of the parts (22, 24, 26, 42).

5 14. The drive according to any one of the preceding claims, characterised in that the parts (22, 24, 26, 42) are welded by a fillet weld (52), in particular in the second region (46) of the contact contour (40).

10 15. The drive according to any one of the preceding claims, characterised in that at least one of the parts (22, 24, 26, 42) has an axial projection (28, 30) for abutting the other part.

15 16. The drive according to claim 15, characterised in that the projection (28, 30) is cylindrical, in particular having an at least partly circular cross section.

20 17. The drive according to claim 15 or 16, characterised in that both parts (22, 24, 26, 42) have an axial projection (28, 30) and in that the projections (28, 30) abut each other.

25 18. The drive according to any one of the preceding claims, characterised in that a welding spot and/or a weld seam (52), in particular in the second region (46), is designed such that the contact contour (40) is smoothed, in particular rounded.

19. The drive according to any one of the preceding claims,
characterised in that
the minimum radial height of the transmission part (26, 42) with respect to
the axis of rotation (41) is formed by the radially deepest region (44) of a
cam disc (42) of the transmission part with respect to the axis of rotation
(41) and/or the base (36) of an interdental space of a pinion of the trans-
mission part (26).

20. The drive according to any one of the preceding claims,
characterised in that
the parts (22, 24, 26, 42) are welded together by laser welding.

21. The drive according to any one of the preceding claims,
characterised in that
a second, separately formed bearing part (24) is provided which is welded
to the transmission part (26) on the side facing away from the first bearing
part (22).

22. A method for producing a drive for a wing of a door or a window or the like,
in which
a drive shaft (20) is formed by at least one bearing part (22, 24) and a sepa-
rate transmission part (26, 42),
wherein the parts (22, 24) axially abut one another by a contact contour
(40),
characterised in that
the transmission part (26, 42) is welded to the bearing part (22, 24) in at
least a first region (45) of the contact contour (40), said first region having a
greater radial height with respect to the axis of rotation (41) of the drive
shaft (20) than a minimum radial height of the transmission part (26, 42).