



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) **EP 1 312 748 A2**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
21.05.2003 Bulletin 2003/21

(51) Int Cl.7: **E06B 9/68**

(21) Application number: **02425663.8**

(22) Date of filing: **30.10.2002**

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
IE IT LI LU MC NL PT SE SK TR**
Designated Extension States:
AL LT LV MK RO SI

(71) Applicant: **GAPOSA S.r.l.**
I-63023 Fermo (AP) (IT)

(72) Inventor: **Postacchini, Dante**
63023 Fermo (AP) (IT)

(30) Priority: **20.11.2001 IT MC20010113**

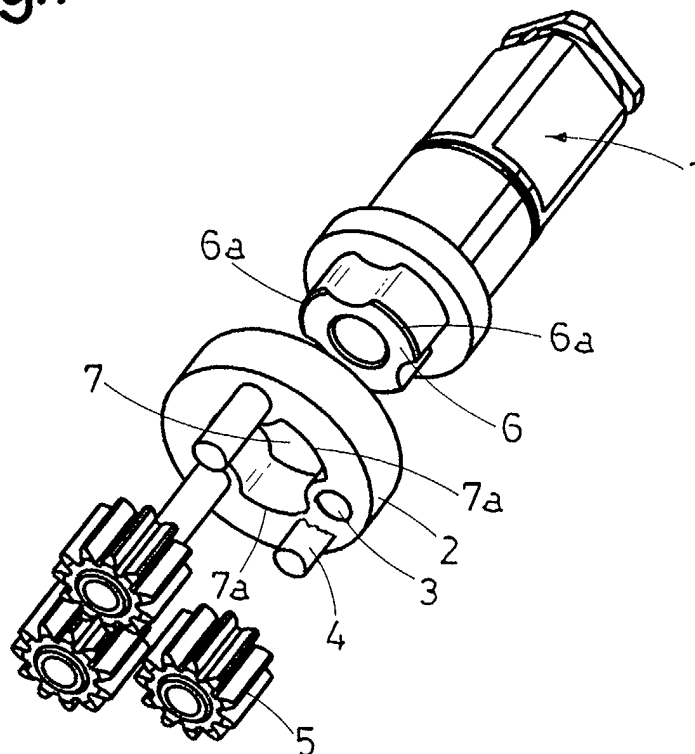
(74) Representative: **Baldi, Claudio**
Piazza Ghislieri, 3
60035 Jesi (Ancona) (IT)

(54) **Light alloy die-cast shaft for tubular reduction gears used for roller shutters and blinds**

(57) The present invention relates to a die-cast shaft (1) made of light alloy, such as aluminium or zinc alloy, designed for use on tubular reduction gears for roller

shutters and blinds. The coupling pin (6) to be inserted into a suitable housing has a series of three regularly spaced external teeth or radial lobes (6a).

Fig.1



EP 1 312 748 A2

Description

[0001] The present patent application relates to a die-cast shaft made of light alloy, such as aluminium or zinc alloy, designed for use on tubular reduction gears for roller shutters and blinds.

[0002] As it is known, roller shutters are externally fixed on a tubular shaft that is dragged into rotation by means of a multistage epicyclic reduction gear, whose shaft is coupled to one end of the shaft, usually with the interposition of an adapter housed and engaged inside the tubular shaft.

[0003] The shaft normally ends with a circular flange with three, regularly spaced peripheral holes, in which the three support pins of the three planetary gears of the epicyclic reduction gear are inserted and fixed.

[0004] Some manufacturers prefer to use steel both for the shaft and the flange that holds the planetary gears. Others prefer to produce the shaft and the flange from a single monolithic steel part.

[0005] In order to reduce production costs of the shaft, it has been suggested and attempted to produce die-cast shafts of light alloy, such as aluminium or zinc alloy. This solution, however, has proved to be unreliable since the alloy parts that come in contact with the steel parts tend to suffer surface wear due to high pressures, thus impairing the correct operation of the mechanisms. In particular, it has been noted that the housings of the flange for the steel pins that hold the planetary gears tend to ovalise, if the flange is made of light alloy.

[0006] To overcome this inconvenience the flange was produced with steel and the shaft with light alloy; this solution, however, was not feasible since the aforementioned problem caused by the surface wear of alloy parts affected the pin, which forms an integral part of the shaft. In this case, the pin did not resist the torsional stress received from the planetary gears-holding flange to which it is matched.

[0007] On the other hand the transversal cross-section of the pin cannot be increased as desired because the diameter of the corresponding housing on the planetary gears-holding flange must be lower than the diameter of the circumference internally tangent to the three holes where the pins are inserted. Moreover, the diameter of the steel flange cannot be increased, since this would involve the new dimensioning of the entire epicyclic reduction gear, with a cost increase not balanced by the cost reduction derived from using die-cast light alloy instead of steel for the shaft.

[0008] The purpose of the present invention is to find a solution to the constructive difficulties illustrated above by realising a light alloy die-cast shaft capable of being mounted on epicyclic reduction gears of standard dimensions that are commonly used for roller shutters and blinds.

[0009] This objective has been achieved thanks to the present invention, which provides for the non-circular cross-section of the pin designed to transmit the twisting

moment between the steel flange that holds the planetary gears and the light alloy die-cast shaft.

[0010] More precisely, the coupling pin externally has a series of three regularly spaced teeth or radial lobes designed to be housed inside corresponding notches located on the edge of the housing.

[0011] The presence of the three teeth or radial lobes on the coupling pin represents the overdimensioning of the pin both as regards the size of its transversal cross-section and the extension of its lateral walls, with consequent reduction of the torsional stresses and surface pressures affecting the pin because of the torque transmitted to the shaft by the reduction gear.

[0012] For major clarity the description of the shaft according to the present invention continues with reference to the enclosed drawings, which are intended for purposes of illustration and not in a limiting sense, whereby:

- 20 - Fig. 1 is an exploded axonometric view of the shaft of the invention in a first preferred embodiment, in which the coupling pin is made of light alloy and moulded with the shaft from a single piece, and the pin housing is located on the steel flange that holds the planetary gears.
- 25 - Fig. 2 is an exploded axonometric view of the shaft of the invention in a second preferred embodiment, in which the coupling pin is made of steel and projects from the flange that holds the planetary gears, and the pin housing is located on the light alloy die-cast shaft.
- 30

[0013] With reference to Fig. 1 the shaft (1) of the invention is designed to be coupled with a steel flange (2) that holds the planetary gears, of standard type and dimensions, which features a series of three regularly spaced holes (3) for the introduction of three steel pins (4) that support the planetary gears (5) that form part of a standard epicyclic reduction gear.

[0014] In the first preferred embodiment, the shaft (1) has a coupling pin (6) that externally features a series of three regularly spaced teeth or radial lobes (6a) housed inside corresponding notches (7a) along the edge of the housing (7) located in the centre of the flange (2).

[0015] In other words it can be said that the notches (7) are regularly spaced with respect to the three holes (3) on the flange (2).

[0016] The coupling pin (6) is made of light alloy and die-cast from one single piece with the shaft (1).

[0017] In the constructive version illustrated in Fig. 2 the shaft (1) has a flange (8) with a housing (9) capable of housing the coupling pin (10) that projects from the steel flange (2) that holds the planetary gears in opposite position to the planetary gears (5).

[0018] The flange (8) is made with light alloy and die-cast from a single piece with the shaft (1), while the pin (10) is made of steel, like the flange (2) and the pins (4)

that support the planetary gears (5).

[0019] The steel pin (10) externally features a series of three regularly spaced teeth or radial lobes (10a) housed inside corresponding notches (9a) along the edge of the housing (9) located in the centre of the flange (8). 5

[0020] In other words it can be said that the teeth or radial lobes (10a) are regularly spaced with respect to the three holes (3) located on the flange (2). 10

Claims

1. A shaft designed for use on tubular epicyclic reduction gears of standard dimensions for roller shutters and blinds, of the type comprising a coupling pin (6 or 10) to be introduced inside a suitable housing (7 or 9), designed to transmit the torque from the flange (2) that holds the planetary gears to the shaft (1), **characterised in that** it is made of die-cast light alloy and the coupling pin (6 or 10) externally features a series of three regularly spaced teeth or radial lobes (6a or 10a) housed inside corresponding notches (7a or 9a) located on the edge of the housing (7 or 9); it being provided that the teeth or radial lobes (6a or 10a) extend beyond the imaginary circumference that is internally tangent to the three holes (3) that are traditionally located on the flange (2) to house the steel pins (4) that support the planetary gears (5) of the epicyclic reduction gear, of which the flange (2) is an integral part. 15 20 25 30
2. A shaft according to the preceding claim, **characterised in that** it is made of die-cast light alloy together with the pin (6), which externally features a series of three regularly spaced teeth or radial lobes (6a) housed inside corresponding notches (7a) located on the edge of the housing (7) in the centre of the flange (2). 35 40
3. A shaft according to claim 1, **characterised in that** it incorporates a flange (8), which is die-cast from one single light alloy piece together with the shaft, featuring a housing (9) capable of housing the steel coupling pin (10) that projects from the steel flange (2) that holds the planetary gears in opposite position to the planetary gears (5); it being provided that the steel pin (10) externally features a series of three regularly spaced teeth or radial lobes (10a) housed inside corresponding notches (9a) along the edge of the housing (9) located in the centre of the flange (8). 45 50 55

Fig.1

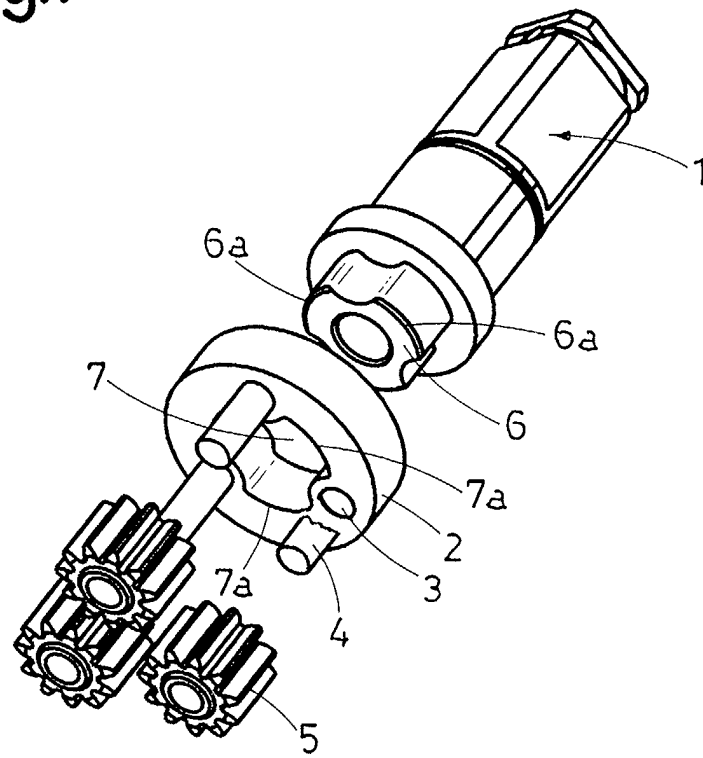


Fig.2

