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(54) **BEARING SUPPORT FOR A TRANSAXLE FINAL DRIVE ASSEMBLY**

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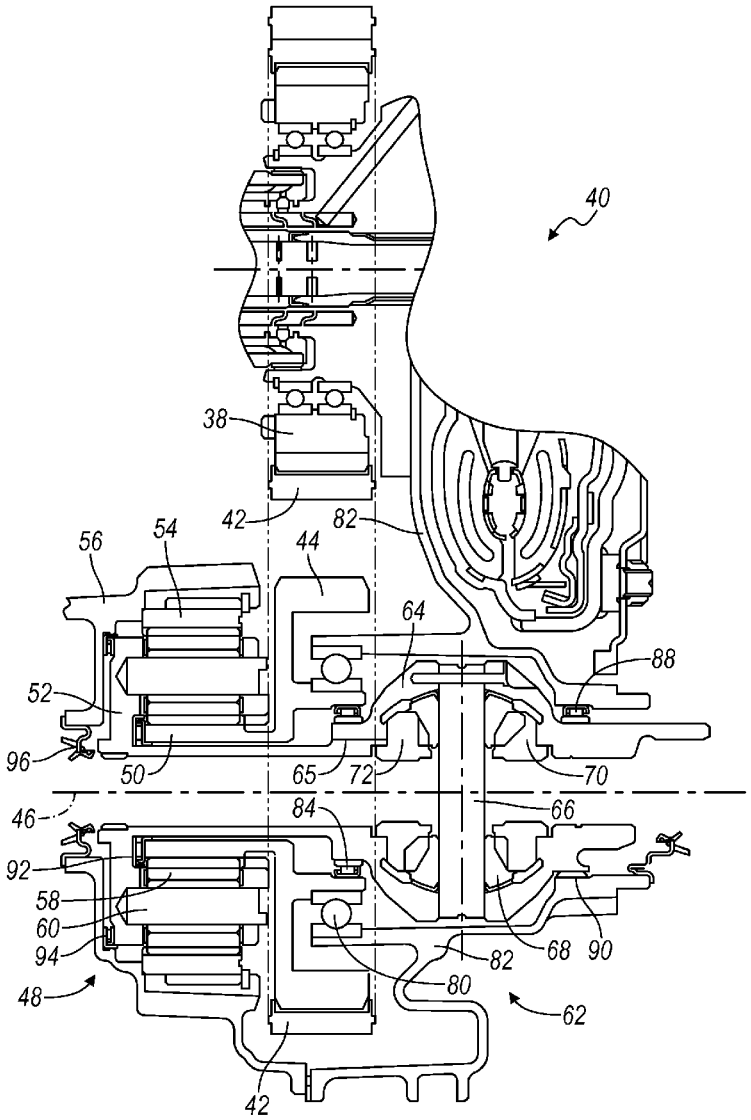
(57) **ABSTRACT**

A drive assembly for a vehicle powertrain includes a planetary gearset including an input and an output, for producing a speed reduction of the output relative to the input, a sprocket secured to the input, a differential housing secured to the output, a casing, a first bearing for supporting the sprocket for rotation on the casing, and a second bearing for supporting the differential housing for rotation relative to the sprocket.



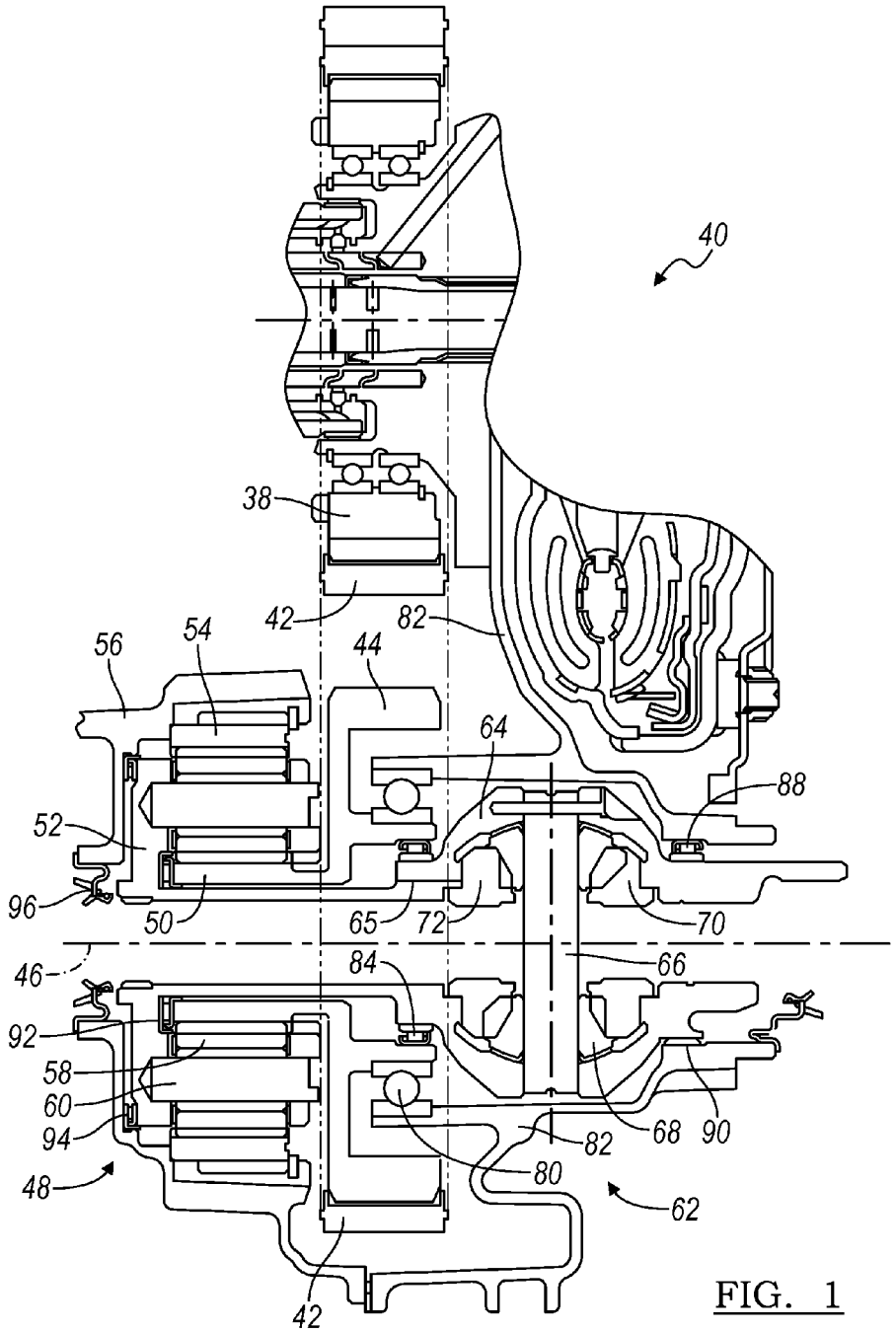

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FIG. 1

BEARING SUPPORT FOR A TRANSAXLE FINAL DRIVE ASSEMBLY

[0001] This is a continuation-in-part application of pending U.S. application Ser. No. 11/937,652, filed Nov. 09, 2007, the entire disclosure of which is incorporated herein by reference.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] This invention relates generally to a bearing support system for a transaxle having a chain drive connection to a transaxle output and a planetary final drive gear.

[0004] 2. Description of the Prior Art

[0005] The output of a transaxle, arranged with its axis transverse with respect to the longitudinal axis of a motor vehicle, is driveably connected through a chain drive mechanism to the axis of the front wheels of the vehicle. The transaxle output is fitted with a first sprocket, engaged by a chain, which transmits torque to a second sprocket at the front wheel axis.

[0006] Conventionally the second sprocket is supported by a bearing on the housing of a differential, which transmits power to the front wheels. But tension in the chain causes unwanted bending of the differential housing in addition to the output torque of the transaxle that is transmitted by the chain to the differential housing.

[0007] Preferably a hydraulic pump that is driven by a torque converter of the transaxle is located away from the axis for the torque converter and the gearing in order to free axial space in the vehicle of the other components of the transaxle. But due to the lack of axial space and the increased number of forward speeds produced by transaxles, the torque converter is moved axial closer to the transaxle output sprocket, thereby limiting available space and optional locations for the final drive gearset.

[0008] If the planetary gearset is located at the left-hand side of the output sprocket in the transaxle, the sprocket is, according to the prior art supported by a bearing on the differential housing causing bending of the housing.

[0009] A need exists in the automotive industry for a final drive mechanism that avoids inducing bending in the differential housing due to chain tension and yet is compatible with changes in the arrangement of transaxle components that allow the axial dimension of the transaxle to be minimized.

SUMMARY OF THE INVENTION

[0010] A drive assembly for a vehicle powertrain includes a planetary gearset including an input and an output, for producing a speed reduction of the output relative to the input, a sprocket secured to the input, a differential housing secured to the output, a casing, a first bearing for supporting the sprocket for rotation on the casing, and a second bearing for supporting the differential housing for rotation relative to the sprocket.

[0011] The drive assembly avoids inducing bending in the differential housing due to chain tension. It accommodates changes in the arrangement of transaxle components that allow the axial dimension of the transaxle to be minimized.

[0012] The scope of applicability of the preferred embodiment will become apparent from the following detailed description, claims and drawings. It should be understood, that the description and specific examples, although indicating preferred embodiments of the invention, are given by way of illustration only. Various changes and modifications to the described embodiments and examples will become apparent to those skilled in the art.

DESCRIPTION OF THE DRAWINGS

[0013] The invention will be more readily understood by reference to the following description, taken with the accompanying drawings, in which:

[0014] FIG. **1** is a partial cross section taken through a transaxle for a motor vehicle showing the final drive assembly and its connection to the transaxle output.

DESCRIPTION OF THE PREFERRED EMBODIMENT

[0015] FIG. **1** illustrates that the output sprocket **38** of a transversely mounted, front wheel drive transaxle **40** is engaged by a drive chain **42**, which also engages a sprocket **44** located at the axis **46** of the front wheels of the vehicle. Rotating power at the transaxle output sprocket **38** is transmitted by chain **42** to the sprocket **44**.

[0016] A grounded planetary, final drive gearset **48** includes a sun gear **50**, secured to sprocket **44**; a carrier **52**; a ring gear **54**, held against rotation on transaxle case **56**; and a set of planet pinions **58**, each pinion **58** meshing with sun gear **50** and ring gear **54** and supported on one of the pinion shafts **60**, each shaft **60** being is secured to carrier **52**.

[0017] An inter-wheel, front differential **62** transmits power from carrier **52** differentially to right-hand and left-hand front wheels through the drive mechanism of differential **62**, located in a differential housing **64**. Carrier **52** is secured at **65** to differential housing **64**. The drive mechanism includes a spindle **66**; bevel pinion **68**, supported to rotate about the axis of spindle **66** and to revolve about axis **46**; and side bevel gears **70**, **72**, secured by a spline connected to right-hand and left-hand halfshafts (not shown), respectively. The halfshafts carry torque to the front wheels of the vehicle.

[0018] Sprocket **44** is supported by a ball bearing **80** on the torque converter case **82**. Transaxle case **56** and torque converter case **82** are secured mutually and are supported on and secured to the vehicle's chassis, which prevents their rotation.

[0019] At the left-hand side of differential **62**, differential housing **64** is supported on the sprocket **44** by a needle bearing **84**, which is preferably aligned radially with bearing **80**.

[0020] At the right-hand side of the differential **62**, differential housing **64** is supported on the torque converter case **82** by a an antifriction device, which may be a needle bearing **88**, as shown above axis **46**, or a bushing **90**, as shown below axis **46**.

[0021] A needle thrust bearing **92** is located between carrier **52** and sun gear **50**. A needle thrust bearing **94** is located between carrier **52** and the transaxle housing **56**.

[0022] In operation, torque at the output sprocket **38** is transmitted by tension in chain **42** to sprocket **44**. The final drive gearset **48** reduces the speed of carrier **52** relative to the speed of sprocket **44** and sun gear **50**. Carrier **52** transmits torque along axis **46** between sun gear **50** and the left-hand halfshaft to the differential housing **64**. An inter-wheel, front differential **62** transmits power from carrier **52** to right-hand and left-hand front wheels through the drive mechanism of differential **62**.

[0023] Chain tension does not induce bending in differential housing **64** because tension in chain **42** that is transmitted to sprocket **44** is carried through bearing **80** to its reaction on torque converter case **82**.

[0024] A dynamic seal **96**, contacting the left-hand halfshaft and casing **56**, and a seal **98**, contacting the left-hand halfshaft and casing **56**, protects against entry of contaminants into the final drive assembly at axis **46**.

[0025] In accordance with the provisions of the patent statutes, the preferred embodiment has been described. However, it should be noted that the alternate embodiments can be practiced otherwise than as specifically illustrated and described.

The invention claimed is:

1. A drive assembly for a vehicle, comprising:
a planetary gearset including an input and an output, for producing a speed reduction of the output relative to the input;
a sprocket secured to the input;
a differential housing secured to the output;
a casing;
a first bearing supporting the sprocket for rotation on the casing;
a second bearing contacting the sprocket, supporting the differential housing for rotation relative to the sprocket.

2. The assembly of claim **1**, wherein the first bearing and the second bearing are mutually aligned and located in a plane substantially normal to an axis about which the sprocket rotates.

3. The assembly of claim **1**, wherein:
the input is a sun gear of the gearset;
the output is a carrier of the gearset;
and the gearset further includes a ring gear secured against rotation, and pinions supported for rotation on the carrier, the pinions meshing with the sun gear and the ring gear.

4. The assembly of claim **3**, further comprising:
a first thrust bearing located between the casing and the carrier; and
a second thrust bearing located between the sprocket and the carrier.

5. The assembly of claim **1**, further comprising:
a transaxle including an output sprocket; and
a chain engaged with the output sprocket and the sprocket for transmitting torque between the output sprocket and the sprocket.

6. The assembly of claim **1**, wherein the sprocket, the gearset and the differential housing are arranged along an axis, the sprocket being located between the gearset and the differential housing.

7. The assembly of claim **1**, wherein the differential housing contains a differential mechanism that distributes to vehicle wheels torque that is transmitted between the differential housing and the output.

8. A drive assembly for a vehicle, comprising:
an output sprocket of a transaxle;
a planetary gearset including an input and an output, for producing a speed reduction of the output relative to the input;
a sprocket secured to the input;
a chain engaged with the output sprocket and the sprocket for transmitting torque between the output sprocket and the sprocket;
a differential housing secured to the output;
a casing;
a first bearing supporting the sprocket for rotation on the casing;
a second bearing contacting the sprocket, supporting the differential housing for rotation.

9. The assembly of claim **8**, wherein the first bearing and the second bearing are mutually aligned and located in a plane substantially normal to an axis about which the sprocket rotates.

10. The assembly of claim **8**, wherein:
the input is a sun gear of the gearset;
the output is a carrier of the gearset;
and the gearset further includes a ring gear secured against rotation, and pinions supported for rotation on the carrier, the pinions meshing with the sun gear and the ring gear.

11. The assembly of claim **10**, further comprising:
a first thrust bearing located between the casing and the carrier; and
a second thrust bearing located between the sprocket and the carrier.

12. The assembly of claim **8**, wherein the sprocket, the gearset and the differential housing are arranged along an axis, the sprocket being located between the gearset and the differential housing.

13. The assembly of claim **8**, wherein the differential housing contains a differential mechanism that distributes to vehicle wheels torque that is transmitted between the differential housing and the output.

14. A drive assembly for a vehicle, comprising:
an output sprocket of a transaxle;
a sprocket;
a chain engaged with the output sprocket and the sprocket;
a differential housing;
a casing;
a first bearing supporting the sprocket for rotation on the casing;
a second bearing contacting the sprocket, for supporting the differential housing for rotation.

15. The assembly of claim **14**, wherein the first bearing and the second bearing are mutually aligned and located in a plane substantially normal to an axis about which the sprocket rotates.

16. The assembly of claim **14**, further comprising:
a gearset including a sun gear secured to the sprocket for rotation therewith, a ring gear secured to the casing against rotation, a carrier secured to the differential housing for rotation therewith, and pinions supported on the carrier and meshing with the sun gear and the ring gear, the gearset producing a speed reduction of the carrier relative to a speed of the sun gear.

17. The assembly of claim **16**, further comprising:
a first thrust bearing located between the casing and the carrier; and
a second thrust bearing located between the sprocket and the carrier.

18. The assembly of claim **14**, wherein the sprocket, the gearset and the differential housing are arranged along an axis, the sprocket being located between the gearset and the differential housing.

19. The assembly of claim **14**, wherein the differential housing contains a differential mechanism that distributes to vehicle wheels rotating power that is transmitted between the differential housing and the sprocket.

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