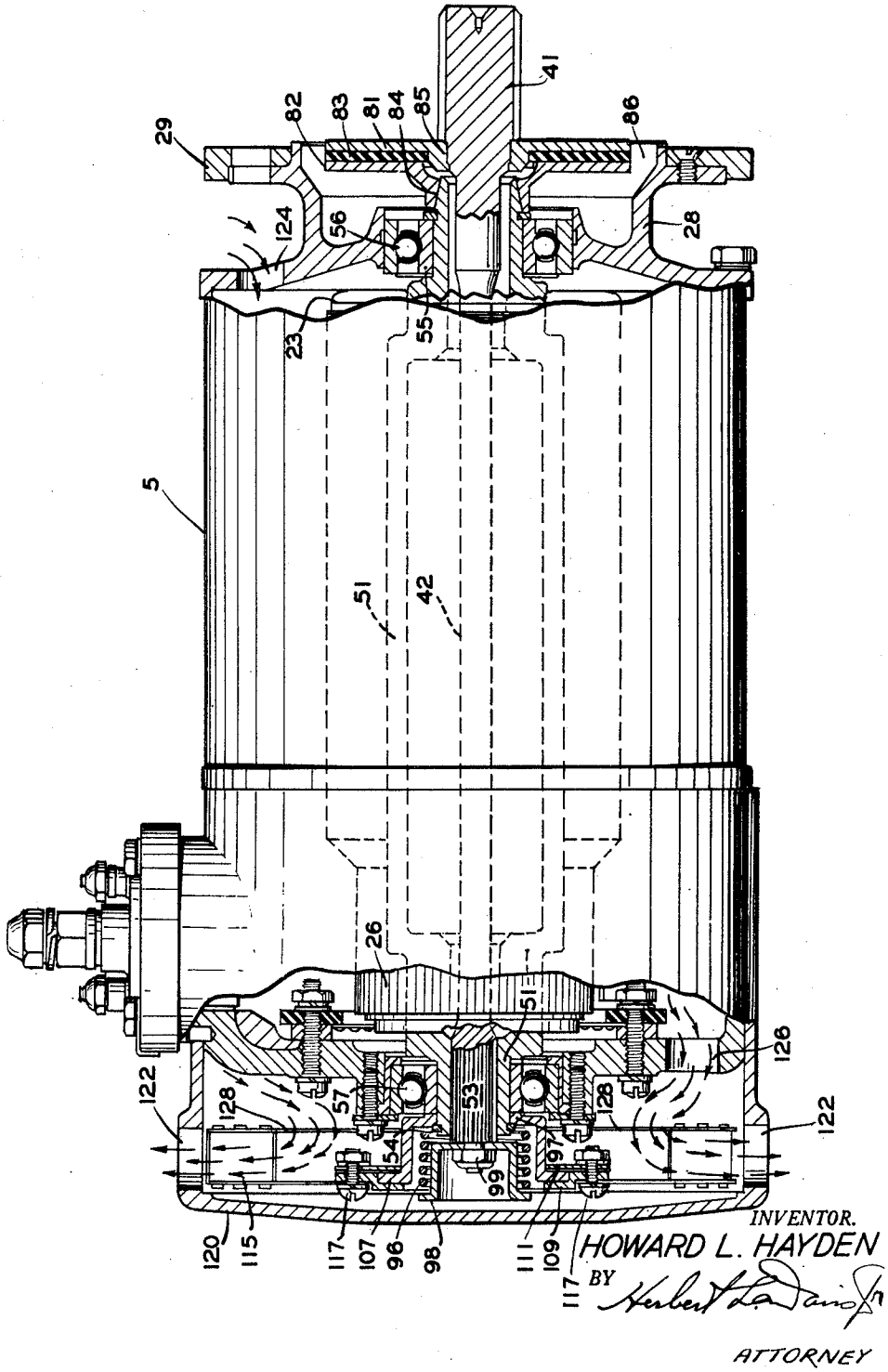
March 27, 1951 H. L. HAYDEN 2,546,448

GENERATOR

Filed Aug. 18, 1949



INVENTOR.
HOWARD L. HAYDEN
BY Herbert L. Davis Jr.
ATTORNEY

Patented Mar. 27, 1951 2,546,448

UNITED STATES PATENT OFFICE

2,546,448

GENERATOR

Howard L. Hayden, Emerson, N. J., assignor to Bendix Aviation Corporation, Teterboro, N. J., a corporation of Delaware

Application August 18, 1949, Serial No. 110,992

4 Claims. (Cl. 171—252)

1

This invention relates to improvements in a generator having an accessory drive pencil shaft and friction disc clutch of the type specifically disclosed and claimed in U. S. application Serial No. 5,757, filed February 2, 1948 by Alfred J. Mastropole, now U. S. Patent No. 2,487,934, and assigned to Bendix Aviation Corporation and of a type claimed broadly in U. S. Patent No. 2,437,954, granted March 16, 1948 to Clinton H. Havill and assigned to Bendix Aviation Corporation.

More particularly the invention relates to the provision in such a generator of a cooling fan and low torque transmitting auxiliary clutch for the fan mounted at the outboard end of the generator and so arranged that excessive torque loads when applied to the fan are not transmitted to the main friction disc clutch which might otherwise cause damage or breakage of the pencil driving shaft.

An object of the invention is to provide a novel auxiliary clutch associated with a generator fan and main generator clutch so as to prevent breakage and damage upon an excessive torque being applied to the fan.

The above and other objects and features of the invention will appear more fully hereinafter from a consideration of the following description taken in connection with the accompanying drawing wherein one embodiment of the invention is illustrated by way of example.

The drawing is a longitudinal view of a device embodying the invention and with certain parts broken to better illustrate the invention.

Referring to the drawing, there is disclosed therein a generator having a sectional housing **5** adapted to receive suitable field poles and field windings, for cooperation with windings on an armature **23**, which armature windings supply current to certain brush connections, not shown, of a commutator **26** in a conventional manner.

The housing **5** is also shown as provided with a reduced section **28** and a flanged portion **29** having a series of holes provided therein whereby the unit may be attached to a suitable mounting surface on the housing of an internal combustion engine or other prime mover which is to drive the generator, by suitable connections (not shown) for imparting rotation to a splined end **41** of an inner pencil shaft **42** of the generator.

The commutator **26** and the armature **23** are interlocked with a hollow shaft **51** which surrounds the inner pencil shaft **42**. The inner shaft **42** is spline connected at one end to the outboard end of the hollow shaft **51**, as indicated at **53**. A lock ring **54** holds shaft **51** against displacement

2

axially, in one direction, while the shoulder of a bearing **55**, by virtue of its engagement with the armature **23**, prevents axial displacement of the shaft **51** in the opposite direction. A ball bearing assembly **56** rotatably supports one end of the hollow shaft **51** while the opposite end is rotatably supported by a ball bearing assembly **57**.

As shown in the application Serial No. 5,757 of Alfred J. Mastropole, now U. S. Patent No. 2,487,934, there is further provided in cooperation with the inner and outer shafts **42** and **51**, a yielding driving assembly including a driving plate **81**, a driven plate **82**, and an intermediate friction surfaced element **83** of suitable frictional torque transmitting material, the said member **83** is suitably fastened to the driven plate **82**. The latter plate **82** is fastened to the hollow shaft **51** through splines or other suitable means at **84**, while the driving plate **81** is fastened at **85** to the shaft end **41**.

The clutch assembly **81**, **82** and **83** is positioned in a shield-like recess **86** formed in the inboard end of the housing **5** and cooperates therewith in protecting the end bearing **56**.

A coiled compression spring **96** surrounds a portion of the opposite outboard end of the hollow shaft **51** and pencil shaft **42** and bears at one end upon the inner surface of cup-shaped member **97**. The member **97** is rotatably fastened at the outboard end of the hollow shaft **51**, and is held in position by the ring **54**. The opposite end of the spring **96** bears upon an outer lip of a cup-shaped member **98** which is affixed at the outboard end of pencil shaft **42** by a fastening nut **99** which screw threadedly engages the pencil shaft **42**.

The foregoing structure is described and claimed in the application Serial No. 5,757, filed February 2, 1948 by Alfred J. Mastropole, now U. S. Patent No. 2,487,934, and assigned to Bendix Aviation Corporation.

Novel fan and auxiliary clutch

The feature of the present invention includes the provision of the cup-shaped member **97** arranged so as to serve as a fan center web member drivingly connected to the shaft **51** by splines or other suitable means and held in position by the snap ring **54**. The member **97** has a shoulder **107** positioned between a member **109** and a resilient member or friction ring **111** fastened to suitable fan blades **115** by adjustable fastening bolts **117** and the ring **111** frictionally engaging the shoulder **107**.

Through suitable adjustment of the bolts **117**,

the tension applied by the resilient ring 111 on the shoulder 107 may be conveniently varied and thereby the torque at which the fan blades 115 slip with relation to the shaft 51 may be adjusted to a predetermined value. Thus in the event of an excessive torque or load being applied to the fan blades 115, as upon the generator being suddenly immersed in water, the friction ring or auxiliary clutch 111 permits the fan 115 to slip with relation to the shoulder 107. Thus slippage of the auxiliary clutch 111 prevents loads in excess of a predetermined safe value when applied to the fan blades 115 from being transmitted through the shaft 51 to the main clutch 81 so as to cause damage to the pencil shaft 42.

A cover cap 120 fits about the outboard end of the generator and is suitably fastened to the housing 5. The cover cap 120 has a plurality of suitable radial openings 122 formed therein and cooperating with the outer ends of the fan blades 115 as air outlet ports. Rotation of the fan blades 115 draws air for cooling the generator through suitable air inlet ports 124 formed at the inboard end of the housing 5, through the housing 5, across the armature 23 of the generator and through openings 126 into a center opening of the fan blades 115, as indicated in the drawing by arrows.

However, upon a load in excess of predetermined value being applied to the fan 115 the friction ring 111 permits slippage of the fan blades 115 with relation to the shoulder 107 and driving shaft 51 thus preventing damage to the pencil shaft 42 or an excessive load from being applied to the clutch discs 81—82.

Although only one embodiment of the invention has been illustrated and described, various changes in the form and relative arrangements of the parts may be made to suit requirements.

What is claimed is:

1. In a generator of a type including a housing, a rotor rigidly mounted on a tubular member, end bearings for said tubular member and supporting said rotor in said housing, a resilient drive shaft extending longitudinally in said tube and in spaced relation thereto, one end of said shaft being drivingly connected to one end of said tubular member, and the other end of said shaft extending from the other end of said tubular member for an external driving connection, a main friction coupling including first and second discs, means drivingly connecting the first disc to said shaft adjacent the other end of said tubular member, other means drivingly connecting the second disc to said tubular member at the other end of said tubular member, and spring means biasing the first of said discs toward the second disc so as to maintain a frictional driving relation between said discs; the improvement comprising fan blades cooperating with openings in said housing for circulating air through the housing, an auxiliary friction coupling drivingly connecting said fan blades to said tubular member and permitting slippage of said fan blades relative to said tubular member upon a load in excess of a predetermined value being applied to said fan blades so as to prevent damage to the resilient drive shaft and the application of the excessive load to the main friction coupling.

2. The combination defined by claim 1 in which there is provided a center web connected to said tubular member and including a shoulder, a resilient ring secured to said fan blades and frictionally engaging the shoulder of said center web so as to permit slippage of the fan blades relative to said center web upon a load in excess of a predetermined value being applied to said fan blades.

3. In a generator, the combination comprising, a housing, an armature, a drive shaft, a driven shaft rotatably mounting the armature in the housing, a main friction clutch drivingly connecting the drive and driven shafts, a fan for cooling the generator, a relatively low torque transmitting friction clutch drivingly connecting the driven shaft and the fan, and means for adjusting said low torque transmitting friction clutch so that upon excessive torque loads being applied to the fan such excessive loads are not transmitted to the main friction clutch and drive shaft.

4. In a generator, the combination comprising, a housing, an armature, a tubular driven shaft rotatably mounting the armature in the housing, a pencil drive shaft extending longitudinally in said tubular driven shaft and in spaced relation thereto, one end of said pencil shaft being drivingly connected to one end of said tube, and the other end of said pencil shaft extending from the other end of said tubular driven shaft for an external driving connection, a main friction clutch drivingly connecting the drive and driven shafts, a fan for circulating cooling air through the housing, a resilient friction ring drivingly connecting the fan and driven shaft, said friction ring being arranged to permit slippage of said fan relative to said driven shaft upon torque loads in excess of a predetermined safe value being applied to said fan.

HOWARD L. HAYDEN.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,193,837	Winther	Mar. 19, 1940

FOREIGN PATENTS

Number	Country	Date
14,505	Great Britain	of 1910